ASM REVIEW OF METAL LITERATURE 1951

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REVIEW OF METAL LITERATURE

An Annotated Survey of Articles and Technical Papers Appearing in the Engineering, Scientific and Industrial Journals and Books, Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio.

Volume 8
1951

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PREFACE

The A.S.M. Review of Metal Literature is a monthly feature of Metals Review, published by the American Society for Metals and distributed to its members. The present volume is a collection of the installments published in Metals Review from February through December 1951. It is the eighth volume in a series that began in 1944.

The annotations are not intended to serve as a substitute for a reading of the articles listed. They are brief abstracts designed to indicate the scope and content of the article so that the reader may determine whether it is something he wants to read in its entirety. In other words, they are indicative rather than informative abstracts.

The method of classifying the annotations into subject subdivisions is based upon the "ASM-SLA Metallurgical Literature Classification," designed by a joint committee of the American Society for Metals and the Special Libraries Association, and published by the American Society for Metals during 1950.

The table of contents lists the main headings into which the A.S.M. Review of Metal Literature is subdivided, together with secondary subdivisions indicating the scope of the main heading. The main sections are designated by capital letters, while the subdivisions are accompanied by numerals which refer to the coding system used in the "ASM-SLA Metallurgical Literature Classification." Each annotation in the text of the book is likewise followed by code symbols which refer to these main and secondary subdivisions. For example, the symbol "C21" in parentheses at the end of an annotation indicates that the literature reference has to do with "Nonferrous Smelting and Refining" (C), and, specifically, "Smelting" (21).

The main divisions of the classification refer primarily to "processes and properties," with a final section "V" to include literature references dealing with specific materials and covering various processes and properties in a broad and general way. Materials are likewise coded by symbol at the end of each annotation, the code for materials following the symbols for processes and properties. Chemical symbols of the elements are used to code metals and alloys. In addition, various materials groups are coded. For example, "EG" plus a lower-case letter refers to an "Element Group," "SG" to "Special Groups," and various combinations of capital letters indicate types of steels and cast irons. For example the symbol "C21" might be followed by the symbol "Cu," written "(C21, Cu)" and indicating

that the reference had to do with smelting of copper alloys. This coding system is explained in detail in the ASM-SLA Metallurgical Literature Classification.

An understanding of this coding system, however, is not essential to the use of this volume of the Review of Metal Literature, which is accompanied by a complete subject index starting on page 723. Since the annotations are classified primarily by processes and properties, the subject index has been prepared with the emphasis primarily on materials. Subheads and cross-references are included in sufficient detail to permit the location of articles on any specific subject related to the metal industry. Indexing is based on the content of the article and not merely on the title.

In using the book, if the primary interest is in the broad field of corrosion, or foundry practice, or heat treatment, turn immediately to the respective section as given in the table of contents. If the main interest is in aluminum alloys, or copper, or cast iron, turn to the corresponding heading in the subject index. If interest lies in specific aspects of foundry practices, or a particular type of heat treatment, these broad processes will be found broken down and subdivided in the subject index. An author index is also provided and a list of addresses of the journals and periodicals from which the literature references are taken.

Preparation of the annotations has been under the direction of W. W. Howell, technical abstractor at Battelle Memorial Institute, assisted by Pauline Beinbreck, Mary Lee Mote, Janet Motyka, and various members of the translation group at Battelle.

Marjorie R. Hyslop
Editor

May 1, 1952

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GENERAL METALLURGICAL

1-A. Steel for Western Needs. John R. Zadra. *Mines Magazine,* v. 40, Dec. 1950, p. 15-18.

Surveys developments of past 50 years in the iron and steel industry of the western U. S. (A4, Fe, ST)

2-A. Metalworking Research Reaches All-Time High: Armour Research Foundation. Robert A. Lubker. *Iron Age,* v. 166, Dec. 21, 1950, p. 74-77.

Fifth of a series. Facilities and metallurgical research programs at Armour. (A9)

3-A. The Supply of Nonferrous Metals. C. Donald Dallas. *Metal Progress,* v. 58, Dec. 1950, p. 839-841.

See abstract of "Important Facts About Our Supplies of Non-Ferrous Metals," *Automotive Industries,* item 309-A, 1950. (A4, Cu, Zn, Al, Pb)

4-A. Notes on Russian Metallurgy. N. H. Polakowski. *Metal Progress,* v. 58, Dec. 1950, p. 866-867.

Former resident of Poland and Russia explains "disappearance" of several Russian journals. How a new openhearth design worked out on paper was adopted on a large scale without sufficient experimentation and resulting trouble and expense. Other deficiencies of Russian metallurgy. (A general)

5-A. The Economics of Raw Material Supplies in the Birmingham District. E. C. Wright. *Mining Engineering,* v. 187, Dec. 1950, p. 1214-1220.

Refers to the iron and steel industry. Trends in procurement and cost for the major steel-producing districts. Results of a 3-yr. survey conducted for the Bureau of Business Research of the University of Alabama. (A4, Fe, ST)

6-A. U. S. Produces Almost Half of World's Steel. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 72-73.

A graphical and tabular presentation. (A4, ST)

7-A. Republic Starts Major Expansion in Cleveland District. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 136, 138.

Plans which will add 672,000 net tons of steel ingot capacity per year to Republic's Cleveland plant. (A4, ST)

8-A. Waste Utilization and Disposal Systems; Cost Studies of Evaporation and Drying. W. D. Kohlins and E. L. Demarest. *Chemical Engineering Progress* (Engineering Section), v. 46, Dec. 1950, p. 597-600.

How to make cost studies for five typical examples: fermentation waste liquor, liquor from rag-cooking operations, fishing-industry applications, metal treating plants; and whey recovery. (A8)

9-A. Questions Advisability of Accelerating Metal Stockpiling Program at This Time. C. Donald Dallas. *Metals,* v. 21, Nov. 1950, p. 7-9.

Believes current shortages are due to excessive demand from industry and government; imposition of copper duty is believed to be poor statesmanship. (A4, Cu)

10-A. World Production of Primary Aluminum in 1951 Is Estimated at 1,445,000 Metric Tons. R. L. Wilcox. *Metals,* v. 21, Nov. 1950, p. 10-12.

U. S. government's combined stockpiling and defense requirements are placed at 220,000 tons for 1950; 65,000-ton world shortage is seen. (A4, Al)

11-A. Removal of Zinc From Zinc-Plated Iron and Steel Scrap. (In German.) Edmund R. Thews and Martin Stromeyer. *Metalloberfläche,* sec. A, v. 4, Nov. 1950, p. 169-172.

General procedures and comparative effects of acid, alkali, and galvanic processes. Importance of first removing any fatty or oily material. A8, Fe, ST, Zn)

12-A. Rubber Goods: What Metalworking Needs and Will Get. Oliver

L. Johnson. *Iron Age,* v. 166, Dec. 28, 1950, p. 57-59.
An economic survey. (A4)

13-A. Sees More Stringent Controls Over Metals to Meet Stockpiling and Defense Needs. Joseph Zimmerman. *Metals,* v. 21, Dec. 1950, p. 7-10.
Economic analysis and forecast. Suggests metal stockpiling be suspended to ease shortages. (A4)

14-A. $120 Billion Metalworking Market Ahead. *Steel,* v. 128, Jan. 1, 1951, p. 85-100.
An economic analysis and forecast. (A4)

15-A. Facts and Figures on Metalworking. *Steel,* v. 128, Jan. 1, 1951, p. 117-148.
Statistics on production and capacity, distribution, shipments, prices, consumption, business indexes, trade, employment and wages for ferrous and nonferrous metals and finished products. (A4, A5)

16-A. 1951 Technical Forum on Progress in Metalworking. *Steel,* v. 128, Jan. 1, 1951, p. 158-164, 166, 168, 170, 174, 177, 180, 185, 188, 190, 193-194, 197, 200, 203, 206, 209, 211, 214, 216, 219, 222, 224, 227, 230, 233-234, 237, 241-242, 244, 247-248, 250, 253-254, 257, 260, 262, 264, 267-268, 271, 275-276.
173 experts briefly summarize what they believe to be the most important technical milestones in metallurgy; heat treating; metal production; casting; forging and forming; machining; surface treatment; joining and welding; materials handling; processing equipment; and lubrication. (A general)

17-A. Metallurgy Geared for All-Out Production. David C. Minton, Jr. *Chemical and Engineering News,* v. 29. Jan. 1, 1951, p. 33-34.
Reviews recent economic and technical developments. (A4)

18-A. Metalworking Meetings Scheduled for 1951. *Iron Age,* v. 167, Jan. 4, 1951, p. 114, 117-118, 120, 122-123.
Lists technical meetings, conventions and expositions on various phases of metalworking and metal production in chronological order. (A10)

19-A. National Trade Associations and Technical Societies. *Iron Age,* v. 167, Jan. 4, 1951, p. 150, 152, 154, 156, 158, 160, 162.
Lists some 200 professional and technical societies and trade associations in metalworking and metal production. Includes addresses and names of individuals in charge of operation of the organizations. (A10)

20-A. Technical Progress. The Horizon Broadens. *Iron Age,* v. 167, Jan. 4, 1951, p. 272-275.
Annual review of metalworking progress. (A general)

21-A. The Iron Age Metal Industry Facts, 1951. *Iron Age,* v. 167, Jan. 4, 1951, p. 279-374.
Annual statistical section covers steel production, prices, and markets; nonferrous production, prices and markets; raw materials, ore, scrap, coal, and coke; metal products—automotive and railroad, casting, forging, and powder metallurgy; machine tools and welding; market and product-research data; labor and safety; government controls; and military buying. (A4)

22-A. Alcoa Today; Vast Growth Underway for War or Peace. W. B. Griffin. *Modern Metals,* v. 6, Dec. 1950. p. 22-25, 28-29, 31, 33-34.
Development and present status of Aluminum Co. of America. Emphasizes role played by I. W. Wilson, Alcoa's senior vice-president. (A4, A1)

23-A. Panel Discussion of the Lead Production Outlook. *Lead Industries Association,* "Proceedings of the Twenty-First Annual Meeting," Apr. 1949. p. 7-28.
Outlooks for different regions as follows: "Northwest", J. B. Haffner; "Utah and the Southwest", F. A. Wardlaw, Jr.; "Midwest and East", Francis Cameron; and "Foreign", R. F. Goodwin. Also includes "Secondary Lead", by Marc S. Goldsmith. Discussions are included. (A4, Pb)

24-A. Lead and the Defense Program. R. B. McCormick. *Lead Industries Association,* "Proceedings of the Twenty-First Annual Meeting," Apr. 1949, p. 29-37; disc., p. 34-37.
The duties of the Munitions Board. Its program in relation to lead for industrial use and government stockpiling. (A4, Pb)

25-A. Panel Discussion of the Outlook for Some Important Lead Products. *Lead Industries Association,* "Proceedings of the Twenty-First Annual Meeting," Apr. 1949, p. 38-69.
Outlooks for the following products: "Lead-Covered Cable", R. K. Spofford; "Tetraethyl Lead", J. H. Schaefer; "Extruded and Rolled Lead Products", Walter P. Carroll; "Lead Oxides", Miles M. Zoller; "Lead Paints", A. R. Knight; "Mixed Metals", Aubrey M. Callis; "Storage Batteries", H. A. Harvey. Discussions are included. (A4, Pb)

26-A. Guide for Steel Buyers. *Steel,* v. 128, Jan. 15, 1951, p. 37-80.
Each product is listed together with sizes available, where produced,

and a simple code for identifying each company. (A4, ST)

27-A. Industrial Hygiene At American Smelting and Refining Company. John N. Abersold and K. W. Nelson. *Journal of Metals,* v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 33-36.

Work of special hygiene laboratory and some of the equipment and procedures which have been adopted for use in connection with specific operations in the smelting and refining of various nonferrous metals. (A7, C general, EG-a)

28-A. America Needs More Aluminum. John Alico. *Light Metal Age,* v. 8, Dec. 1950, p. 8-10, 24-25.

The present situation and suggests methods for increasing production. (A4, Al)

29-A. Designing for Military Requirements. *Product Engineering,* v. 22, Jan. 1951, p. 85-100.

Special section covers military specifications, their origin and development; design trends; government research and how to get it; a military directory showing who buys what; and an outline of the defense organization. (A5, T2)

30-A. New England as a Possible Location for an Integrated Iron and Steel Works. Walter Isard and John H. Cumberland. *Economic Geography,* v. 26, Oct. 1950, p. 245-259. (Reprint.)

An economic analysis. 29 ref. (A4)

31-A. Treatment and Disposal of Cyanide-Bearing Wastes. John E. Tarman and Max U. Priester. *Proceedings of the Fifth Industrial Waste Conference,* Nov. 29-30, 1949, p. 40-52. (*Purdue University, Engineering Bulletin,* v. 34, Extension Series No. 72, July 1950.)

Specific problems, treatment systems, facilities, and results at four different plants. (A8)

32-A. Treatment of Acid, Cyanide, and Chromium Wastes. C. F. Waite. *Proceedings of the Fifth Industrial Waste Conference,* Nov. 29-30, 1949, p. 223-231. (*Purdue University, Engineering Bulletin,* v. 34, Extension Series No. 72, July 1950.)

Problems and treatment procedures at the King-Seeley Plant at Scio, Mich. (A8, Cr)

33-A. Peculiar Characteristics of Chromium. Don E. Bloodgood and Aubrey Strickland. *Proceedings of the Fifth Industrial Waste Conference,* Nov. 29-30, 1949, p. 232-242. (*Purdue University, Engineering Bulletin,* v. 34, Extension Series No. 72, July 1950.)

Investigations at Purdue University for using commercial ion-exchange resins in producing Cr-free water and recovery of valuable Cr compounds from dilute waste waters. 11 ref. (A8, Cr)

34-A. Disposal of Waste Pickling Liquors. Thomas F. Reed. *Proceedings of the Fifth Industrial Waste Conference,* Nov. 29-30, 1949, p. 286-295. (*Purdue University, Engineering Bulletin,* v. 34, Extension Series No. 72, July 1950.)

Reviews available processes and their lack of suitability in solving the disposal problem. Defines the problem, emphasizing sulfuric acid pickle liquor wastes resulting from the removal of surface oxides from steel. (A8, ST)

35-A. (Book) **Standard Metal Directory.** Joseph Zimmerman, editor. 1950 Ed. 818 pages. Atlas Publishing Co., Inc., 425 West 25th St., New York 1, N. Y. $15.

Completely revised. Five sections embracing iron and steel plants, ferrous and nonferrous metal foundries, rolling mills, steel rolling mills, smelters and refiners. Plants are listed geographically and alphabetically. Includes many special lists. (A4)

36-A. (Book) **Institute of Scrap Iron & Steel Yearbook.** 122 pages. 1950. The Institute, 1536 Connecticut Ave., Washington 6, D. C.

(A4, A8, Fe, ST)

37-A. (Book) **Proceedings of the Twenty-First Annual Meeting, Lead Industries Association.** 69 pages. 1949. The Association, 420 Lexington Ave., New York 17, N. Y. $2.00.

Covers meeting held in Chicago Apr. 8-9, 1949. Includes an opening address, two panel discussions, and a paper. Covers production outlook, outlook for some lead products, and the relation of lead to the defense program. The panel discussions and the paper are abstracted separately. (A4, Pb)

38-A. (Book) **National Physical Laboratory Reports for the Year 1948 and 1949.** His Majesty's Stationery Office, 1950. 64 and 68 pages, respectively.

Reports work of the Aerodynamics, Electricity, Engineering, Light, Mathematics, Metallurgy, Metrology, Physics, Radio, Electronics, and Ship divisions. (A9)

39-A. (Book) **Metal Industry Handbook & Directory.** 468 pages. 1950. Louis Cassier Co., Dorset House, Stamford St., London S.E.1, England.

Includes additions to tables covering thermal expansion and specific resistance, and to official British specifications for nonferrous alloys. New tables cover the weights of cold drawn Ni and Ni-alloy tubes. (A4, S22, EG-a)

40-A. (Book) **Iron & Steel Directory and Handbook.** Ed. 6. 302 pages. 1950. Louis Cassier Co., Ltd., Dorset House, Stamford St., London S.E.1, England.

The directory section includes lists of British pig-iron manufacturers, iron founders, steel works, steel founders. Iron and steel trade associations and iron, steel, and engineering scientific and technical societies and institutions are listed with addresses. The handbook section contains a large amount of technical data for engineers, metallurgists, and iron and steel makers and users (A4, Fe, ST)

41-A. (Book) **Hierro y Acero** (Enciclopedia Siderurgica). (Iron and Steel Encyclopedia.) Hugh P. Tiemann. 1950. 782 pages. Translated and published by the Instituto del Hierro y del Acero, 1st Ed. Madrid, Spain, 75 Ptas.

Translation of the latest edition (1933) of Tiemann's pocket encyclopedia fills a gap in converting terms from one language to the other. The alphabetical order of the words and terms collected, defined and explained by Tiemann is followed with the Spanish equivalent, explanation and proper cross reference. Includes list of Spanish terms found in the text and the equivalent English ones, which enhances the value of the book to the reader and translator. The Spanish Iron and Steel Institute has rendered a decided service to both Spanish-speaking and English-speaking metallurgists. —F.R.M. (A10)

42-A. Metalworking Climbing Toward World War II Levels in 1951. *American Machinist,* v. 95, Jan. 22, 1951, p. 131-164.

Annual Metalworking Facts Section presents extensive tabular, graphical, and textual information concerning production, prices, etc. Includes guide to defense business and government procurement and list of defense-contract awards to date. (A4)

43-A. American Machinist 1951 Production Preview. *American Machinist,* v. 95, Jan. 22, 1951, p. 165-212, 215-262, 265-312.

New metalworking equipment, parts, and materials. Includes machine tools and attachments; tools and accessories; forming, forging, casting; welding and heat treating; layout and inspection; cleaning and finishing; plant service equipment; and parts and materials.
(A general, G general)

44-A. Ten Years in Steel. Harry W. McQuaid. *Metal Progress,* v. 59, Jan. 1951, p. 55-57.

Economic and technical developments of the past ten years. Pig iron and scrap, economics of plant location, technical and mechanical improvements, changes in alloy steels, and the metallurgist's future. (A4, D general, ST)

45-A. The Steel Plant Laboratory; Its Function and Value. Stephen Bianco. *Western Machinery and Steel World,* v. 42, Jan. 1951, p. 82-85.

Includes details of equipment and procedure of the laboratory of Bethlehem Pacific Steel Corp.'s South San Francisco plant. (A9, ST)

46-A. Electrical and Allied Developments During 1950. Guy Bartlett. *General Electric Review,* v. 54, Jan. 1951, p. 15-60.

A survey. Applications in research (metallurgical, chemical, electronic, and nuclear); testing and measuring; power; industrial electrical equipment; transportation; electromedical; electronics; lighting; air conditioning; appliances; construction materials; chemistry; plastics; and metallurgy (including welding and miscellaneous metal-working processes). (A general)

47-A. The AEC in Solid-State Metallurgy. D. W. Lillie. *Nucleonics,* v. 8, Jan. 1951, p. 17-23.

Early in 1948, the AEC began to encourage sound proposals for metallic-state research. An integrated program was built around the resulting basic research. Examples of progress to date. (A9)

48-A. Experience With Chlorination of Cyanides in the General Motors Corporation. I. Introduction. David Milne. **II. Detroit Diesel Engine Division.** P. W. Uhl. **III. Pontiac Motor Division.** Earl J. Roy. **IV. Delco-Remy Division.** C. F. Hauri. *Sewage and Industrial Wastes,* v. 23, Jan. 1951, p. 64-81.
(A8)

49-A. Review of United States 1950 Mineral Production. *Skillings' Mining Review,* v. 39, Jan. 27, 1951, p. 1, 4.
(A4)

50-A. The British Iron and Steel Industry. *Engineer,* v. 191, Jan. 5, 1951, p. 17-19; Jan. 12, 1951, p. 62-64.
A review. (A4, Fe, ST)

51-A. Developments in the Iron and Steel Industry During 1950. I. E. Madsen. *Iron and Steel Engineer,* v. 28, Jan. 1951, p. 109-137..
(A general, Fe, ST)

52-A. Progress in Industry Awaits Many Developments in Engineering Materials. T. C. Du Mond. *Materials & Methods,* v. 33, Jan. 1951, p. 57-61.

Needs of industry for materials of better resistance to corrosion and to high temperatures, also other miscellaneous requirements. Need for more basic research. (A general)

53-A. Review of Materials Engineering Developments in 1950. T. C. Du Mond. *Materials & Methods,* v. 33, Jan. 1951, p. 85-96.

Covers irons and steels; nonferrous metals; nonmetallic materials; fabricated parts and forms; finishes; heat treating; cleaning and finishing; welding and joining; testing; and inspection. (A general)

54-A. Grades of Lake Superior Iron Ore Shipped in 1950. *Skillings' Mining Review,* v. 39, Feb. 10, 1951, p. 1, 4, 6.

Tonnages from different ranges and of different grades are tabulated. (A4, Fe)

55-A. Titanium: Huge Expansion for Defense Paves Way for Civilian Uses. F. L. Church. *Modern Metals,* v. 6, Jan. 1951, p. 19-21.

Economic survey and forecast. (A4, T general, Ti)

56-A. Steel Capacity in '52 Set at Over 120 Million Tons. John Delaney. *Iron Age,* v. 167, Feb. 1, 1951, p. 121-122.

Planned-capacity data are tabulated and discussed. (A4, ST)

57-A. Iron Ore Shipments From United States Mines Will Approximate 97,000,000 Gross Tons. Verne D. Johnston. *Blast Furnace and Steel Plant,* v. 39, Jan. 1951, p. 57-62.

1950 estimates for shipments from various districts and ranges, also breakdown for method of shipment. (A4, A5, Fe)

58-A. Steel for the Expanding Industry of California. Alden G. Roach. *Blast Furnace and Steel Plant,* v. 39, Jan. 1951, p. 78-82, 84.

Expansion of California's industrial economy and supply of steel on the West Coast. Appraises demands which face the steel industry in the West and the extent to which it has expanded to meet these demands. (A4, A6)

59-A. Electric Furnace Capacity Passed 7,000,000 Tons in 1950. James A. Clark. *Blast Furnace and Steel Plant,* v. 39, Jan. 1951, p. 83-84.

Expansion in steelmaking. (A4, D5, ST)

60-A. Consumption of Metallics in 1950 Sets Record. Edwin C. Barringer. *Blast Furnace and Steel Plant,* v. 39, Jan. 1951, p. 85-86.

Data on steel scrap consumption. (A4, A8, ST)

61-A. Western Steel Plants Increasing Output Rapidly. Thomas A. Dickinson. *Blast Furnace and Steel Plant,* v. 39, Jan. 1951, p. 87-92.

An illustrated survey. (A4, ST)

62-A. Los Angeles County Air Pollution Control; A Progress Report. 1. The Apex Steel Corp. Ltd. Installation. T. L. Harsell, Jr. **2. The General Metals Corp. Installation.** F. L. Stamm. *Western Metals,* v. 9, Jan. 1951, p. 28-30.

The installations and results obtained. (A7)

63-A. New G-E Measurements Laboratory Opened at Lynn, Mass. *Industrial Heating,* v. 18, Jan. 1951, p. 62, 64, 66, 68, 70, 132.

Laboratory for work in magnetism, electricity, chemistry, metallurgy, sound, heat, light, and color. (A9)

64-A. Genius for Rent. Morton M. Hunt. *Steelways,* v. 7, Jan. 1951, p. 4-7.

Facilities and organization for industrial research at Battelle Memorial Institute. Specific examples. Advantages of "renting" the use of brains and equipment available at independent research laboratories such as Battelle. (A9)

65-A. Materials. Wallace R. Brode. *Journal of the Franklin Institute,* v. 251, Jan. 1951, p. 81-92.

Surveys past progress and future possibilities. (A general)

66-A. The Metalworking Industries—Scoreboard for the Decade. H. McLeod. *Canadian Metals,* v. 14, Jan. 1951, p. 10-12, 43-49.

Statistical record for Canada for 1939 to 1950. (A4).

67-A. Metallurgical Research; Review of Progress During the Past Decade. N. P. Allen. *Metal Industry,* v. 78, Jan. 12, 1951, p. 29-30.

Abridged presentation of a lecture. Examples of practical achievements in the nonferrous field. (A general, EG-a)

68-A. Re-Treatment of Metallic Wastes: Especially Zinc Residues. C. C. Downie. *Mining Journal,* v. 236, Jan. 19, 1951, p. 56-57.

Various methods, their technology and economics. (A8, Zn)

69-A. 1950 Iron Ore Production and Shipments. *Skillings' Mining Review,* v. 39, Feb. 17, 1951, p. 1-2.

Data for various U. S. districts. (A4, B10, Fe)

70-A. Steel Expansion. *Monthly Business Review,* v. 33, Feb. 1951, p. 1-2, 6.

Statistical summary, especially since 1936. (A4, ST)

71-A. Metallurgical Developments in 1950. *Engineer,* v. 191, Jan. 26, 1951, p. 119-121.

A review. (A general)

72-A. (Pamphlet) **Engineering Foundation: Annual Report.** Engineering Foundation, 29 W. 39th St., New York 18, N. Y. Oct. 1950, 75 pages.

Progress reports of current projects concerned with fluid meters, plastic flow of metals, furnace performance, riveted and bolted structural joints, reinforced concrete, corrosion of water pipes, building research, iron alloys, diffusion of steel, mechanical properties of binary alloy ferrites, welding, etc. (A9)

73-A. Both as Producer and Consumer. J. E. Eberhardt. *Chemical and Engineering News,* v. 29, Feb. 19, 1951, p. 644-646.

Problems of the steel industry varying from raw materials to sales which a cooperative and research-minded chemical industry can help to solve. (A9)

74-A. The Successful Attack. Hamnett P. Munger. *Chemical and Engineering News,* v. 29, Feb. 19, 1951, p. 647-649.

Results of research by chemists and chemical engineers on problems of steel producers include flotation reagents, removal of sulfur from coke-oven gas, uses of oxygen, mold coatings, core binders, palm-oil substitutes for cold rolling, rust-preventive oils, phosphate coatings, descaling stainless steel, salt baths and liquid carburizers, quenching oils, organic finishes, metal-bonding adhesives, porcelain enamels, etc. (A9)

75-A. Hooded Machines Run Toxic and Radioactive Jobs. S. S. Gold. *American Machinist,* v. 95, Feb. 19, 1951, p. 133-135.

Hooded machine tools equipped with exhaust systems for toxic fumes and dusts and with collectors for chips and turnings. They were developed at Argonne National Laboratory. (A7, G17, EG-h)

76-A. Metals in Review. *Engineering and Mining Journal,* v. 152, Feb. 1951, p. 74-97.

Consists of the following articles surveying economic developments and trends of the past year: "Gold", M. A. Kriz; "Silver", Dickson H. Leavens; "Copper", H. H. Wanders; "Lead", Robert L. Ziegfeld; "Zinc", Charles R. Ince; "Tin", H. H. Wanders; "Light Metals", Richard J. Lund; "Minor Metals", Charles White Merrill; "Cobalt", Hubert W. Davis; "Antimony", Arnold S. Kemp; "Bismuth", Arnold S. Kemp; "Cadmium", Richard H. Mote; "Arsenic", Arnold S. Kemp; "Beryllium", Jack W. Clark; "Mercury", Helena M. Meyer; "Platinum-Group Metals", Hubert W. Davis; "Titanium", Frank J. Cservenyak; "Magnesium" (anon.); "Chromite", Norwood B. Melcher; "Manganese", Norwood B. Melcher; "Molybdenum", Robert W. Geehan; "Nickel", Hubert W. Davis; and "Tungsten", Robert W. Geehan. (A general)

77-A. Gas-Fired Furnaces. Installations at the Rogerstone Works. *Metal Industry,* v. 78, Feb. 2, 1951, p. 83-85, 87.

Use in various phases of aluminum fabrication at British plant. (A5, F general, G general, Al)

78-A. How G.E. Makes Turbojets. E. J. Tangerman. *American Machinist,* v. 95, Feb. 5, 1951, p. 135 154.

Unusual operations in the manufacture of the J-47 turbojet. Steps in the process which represent advanced practice applicable also to other products in other plants. Includes forging, press operations, pickling, inspection, welding, machining operations, and assembly. (A5, T25)

79-A. Sparking Magnesium. Allen S. Russell. *Metal Progress,* v. 59, Feb. 1951, p. 228-231.

A black coating occasionally found on magnesium ingots may spark and burn violently when hit or scraped against another ingot. The active agent has been identified as an intimate mixture of metal and sulfur, the latter being formed from the SO_2 atmosphere used to prevent burning of the Mg. Possible hazard of the phenomenon. (A7, Mg)

80-A. Researchers in Metallurgy. Will Vandermeer. *Western Machinery and Steel World,* Feb. 1951, p. 64-67.

Facilities and work of Ryan Aeronautical Co.'s engineering laboratory. (A9)

81-A. The South's Research Resources. R. A. Morgen. *Journal of Southern Research,* v. 3, Jan.-Feb. 1951, p. 6-14.

Includes "First Annual Directory of Southern Research Services and Facilities." (A9)

82-A. ARI's Burton Says: Scrap Disposal Plan Menacing Aluminum Smelters and Foundries. *Modern Metals,* v. 7, Feb. 1951, p. 44, 46.

Testimony of Carl H. Burton, secretary of the Aluminum Research Institute at Hearings on Monopoly in Aluminum held by the House Subcommittee on Monopoly Power. (A4, A8, Al)

83-A. Standards Bureau Marks Half-Century. E. E. Halmos, Jr. *Engineering News-Record,* v. 146, Mar. 8, 1951, p. 32-34.

Activities and mode of operation of National Bureau of Standards. (A9)

84-A. Economic Uses for Metallurgical Slags. Leslie Bor. *Mining Magazine,* v. 84, Feb. 1951, p. 84-86.
Mechanical and chemical uses. (A8)

85-A. Annual Review: Nonferrous Metals. Simon D. Strauss. *Mining Engineering,* v. 190, Feb. 1951, p. 110-112.
Surveys economic status and trends. (A4, EG-a)

86-A. Annual Review: Geology is Still the Key to Mineral Supplies. Roger H. McConnel. *Mining Engineering,* v. 190, Feb. 1951, p. 113-117.
New discoveries and developments of 1950 in metallic and nonmetallic minerals. (A4, B10)

87-A. A Review of World Coal and Iron Ore Resources and Their Utilization for Manufacture of Steel. Part I. W. C. Rueckel. *Blast Furnace and Steel Plant,* v. 39, Feb. 1951, p. 195-199.
Introduction plus data on the world's coal and iron-ore reserves. (To be continued.) (A4, B10, ST)

88-A. Chemistry of Waste Cyanide Treatment. David Milne. *Sewage and Industrial Wastes,* v. 23, Feb. 1951, p. 174-180.
Classifies reaction in which cyanides may be involved; classifies available treatment methods under the appropriate equilibrium system; and reviews each equilibrium system for other reactions of possible use as treatment methods for cyanides. (A8)

89-A. Waste Pickle Liquor Disposal in Molten Blast Furnace Slag. S. S. Heide. *Steel Equipment & Maintenance News,* v. 4, Feb. 1951, p. 8-9.
Patented process in which the pickle liquor is absorbed by bringing in contact with molten slag. The dried slag is crushed and used as a fertilizer ingredient. Several hundred tons have been successfully produced. (A8, Fe)

90-A. Metal Tariffs Do Not Act as Import Barrier; Current Duties Viewed as Extremely Modest. Felix Edgar Wormser. *Metals,* v. 21, Mar. 1951, p. 7-8, 12.
(A4)

91-A. Canadian Nickel Available for Stockpiling; Distribution in 1950 Sets Peace-Time Peak. John F. Thompson. *Metals,* v. 21, Mar. 1951, p. 9, 15.
Production and supply situation. (A4, Ni)

92-A. Current Zinc Shortage Raises Questions—Where are Supplies? Why Not Boost Output? Ernest V. Gent. *Metals,* v. 21, Mar. 1951, p. 10, 12.
(A4, Zn)

93-A. Copper. C. H. Winship, Jr. *Mining Congress Journal,* v. 37, Feb. 1951. p. 50.
Economic developments and trends. (A4, Cu)

94-A. Lead in 1950. Floyd M. Wiles. *Mining Congress Journal,* v. 37, Feb. 1951, p. 51-52.
Economic developments and trends. (A4, Pb)

95-A. Zinc. R. J. Mechin. *Mining Congress Journal,* v. 37, Feb., 1951, p. 53-54.
Economic developments and trends. (A4, Zn)

96-A. Iron Ore. William S. Cumings. *Mining Congress Journal,* v. 37, Feb. 1951, p. 59-61.
Production data for 1950 for various districts in the U. S. and abroad. (A4, Fe)

97-A. Domestic Supplies of Strategic Minerals. David D. Baker. *Mining Congress Journal,* v. 37, Feb. 1951, p. 69-70, 76.
Surveys supplies of Mn, Cr, V, Mo, W, Co, Ni, Sb, Hg, and Ti. (A4, B10, EG-a)

98-A. Silver. Pat McCarran. *Mining Congress Journal,* v. 37, Feb. 1951, p. 104-105.
Present economic status and possible governmental actions. (A4, Ag)

99-A. Chromium Salvage. *Chemical Industries Week,* v. 68, Mar. 3, 1951, p. 21, 23.
How Cr-containing ions can be recovered economically from anodizing, electroplating, and copper stripping baths. (A8, L general, Cr)

100-A. Pickle Liquor Disposal Can Pay Off. F. D. Jones, *Iron age,* v. 167, Mar. 8, 1951, p. 88-91.
Methods for disposal and recovery of valuable by-products. Waste pickle liquor from the pipe mill is reacted with zinc wastes from the galvanizing shop. Zinc sulfate, zinc chloride and iron hydrate pigment are produced. (A8, Zn)

101-A. Wilson Puts the Brakes on Granting Certificates of Necessity for Expansion of Steel Industry. *Iron Age,* v. 167, Mar. 8, 1951, p. 110-111.
Includes tabular list of all Certificates of Necessity issued through Jan. 30, 1951. Defense Mobilizer C. E. Wilson believes that contracts already placed and the production potential of the expanded steel industry will be ample to meet requirements up to 1953. (A4, ST)

102-A. Cyanide Waste Disposal and Control. C. F. Hauri. *Plating,* v. 38, Mar. 1951, p. 240-242, 265.
Procedures of Delco-Remy Div., General Motors Corp., Anderson, Ind. (A8)

103-A. Steel Catches Up. *Fortune,* v. 43, Mar. 1951, p. 68-71, 127-128, 130, 132, 134, 137.

Surveys steel capacity of the U. S., the Free Nations, and the Soviet Bloc. Indicates that there will be enough for mobilization, but not for isolation. (A4, ST)

104-A. Mineral Production Substantial Gain in 1949. Harold MacLeod. *Canadian Mining Journal,* v. 72, Feb. 1951, p. 56-65.

Canadian statistics. (A4)

105-A. Literature. "The American FIAT Review of German Science. Vol. 31. General Metallurgy," 1950, p. 381-385.

Includes 13 references on fine structure and metal physics, 23 on general metallurgy, 18 on strength characteristics and materials testing, 6 on corrosion, and 12 on analyses. 72 ref. (A general)

106-A. More About Air Pollution Problems. Meteorological Conditions Affecting Air Pollution. A. H. Eichmeier. Testing Procedures and Equipment. George E. Tubich. **Toxic Gases; Effect on Plant Life.** Forrest C. Strong. *American Foundryman,* v. 19, Mar. 1951, p. 51-57.

Concludes series presented at the 1950 Michigan Regional Foundry Conference, Nov. 10-11, 1950. (A7, E general)

107-A. The National Bureau of Standards and Its International Relations. Wallace R. Brode. *Foreign Commerce Weekly,* v. 42, Mar. 12, 1951, p. 3-4, 27.

Cooperative work with foreign research agencies and as U. S. representative in exchange of technologic information, and in establishment and definition of scientific standards. (A9, S22)

108-A. Redesigning a Secondary Smelting Plant. Earl R. Marble, Jr. *Journal of Metals,* v. 3, Mar. 1951, p. 218-222.

The Newark, N. J., plant of American Smelting and Refining Co., makes Sn and Pb-base alloys from both scrap and primary metals, and Zn-base die-casting alloys. Includes furnace charge preparation, dross smelting, furnace flue system and gas handling, dust recovery and treatment, refining furnace metals, processing refined metal, utilities, services and safety, welfare, and employment. (A8, C general, Sn, Pb)

109-A. Chemical and Physical Aids to Iron and Steel Research. *International Chemical Engineering and Process Industries,* v. 32, Feb. 1951, p. 76-77.

Current work at the Physics Laboratories of the British Iron and Steel Research Assn. (A9, Fe, ST)

110-A. The Australian Silver-Lead-Zinc Industry. L. A. Lyons. *Mine & Quarry Engineering,* v. 17, Mar. 1951, p. 77-85.

An illustrated statistical survey. (A4, Ag, Pb, Zn)

111-A. Aluminium Supply and Demand. *Metallurgia,* v. 43, Feb. 1951, p. 65-66.

Present British position. (A4, Al)

112-A. (Book). Economics of American Industry. Ed. 2. E. B. Alderfer and H. E. Michl. 716 pages. 1950. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18. $5.50.

Revised and brought up to date. Includes technological and structural changes which have taken place since the first edition was published in 1942. Industries included are: metal and metal fabricating, nonmetallic minerals, chemicals, petroleum, rubber, textiles, apparel, food, etc. Latest available data to indicate changes in productive capacity, shifts in location, development of new industrial areas, and additional manufacturing facilities. (A4)

113-A. (Book) 52nd Annual Report Mining Industry of the State of Idaho for 1950. 256 pages. State of Idaho, Boise, Idaho.

Safety programs, accidents, wage rates, and the outlook for different nonferrous metals. Includes a 30-page bibliography on Idaho's mineral resources. (A4, B10, B12, EG-a)

114-A. Western Metalworking Appraisal and Forecast. *Western Metals,* v. 9, Mar. 1951, p. 27-40.

Economic and technological status and prospects. Section on "Production" consists of the following: "Basic Steel," Walther Mathesius; "Steel Fabrication," E. F. Gohl; "Steel Pipe," Jack L. Ashby; "Merchant Steel—Plates—Sheets," Alden G. Roach; "Aluminum," C. S. Thayer. Section on "Processing" consists of the following: "The Machine Shop," J. C. Axelson; "The Foundry," Carleton B. Tibbets; "The Forge," W. A. DeRidder. Section on "Manufacture" consists of the following: "Aircraft," Leland D. Webb; "Automotive," Charles E. Walls; "Fasteners," Price Berrien; "Agricultural Machinery," E. E. Houston; "Oil Tools," E. S. Dulin; "Domestic Appliances," W. J. Bailey, Jr. (A4)

115-A. Mobile Drum Factory Takes the Work to the Job. *Sheet Metal Industries,* v. 28, Mar. 1951, p. 234-239.

British "factory" housed in truck trailers. Operations include rolling, forming, trimming, welding, and finishing. (A5, CN)

116-A. New Precipitation Plant at Butte. A. C. Bigley, F. F. Frick, M. McCanna, and J. P. Ryan. *Mining Congress Journal,* v. 37, Mar. 1951, p. 48-53.

How Anaconda recovers copper from mine water in the Butte mines. Cu and Fe sulfides are oxidized, with formation of $CuSO_4$, $FeSO_4$, and insoluble basic iron sulfates. These, together with more or less ore slime, are found in the mine water. In the precipitation process, the principal reaction is precipitation of metallic Cu by reaction of $CuSO_4$ with ferrous scrap. (A8, Cu)

117-A. Neutralizing Industrial Waste Liquids. *Steel,* v. 128, Apr. 9, 1951, p. 74-77, 95, 98, 101, 104, 108, 111-112.

Survey of accepted chemical treatments for pickle liquors, soluble oil mixtures and plating-tank effluents shows progress in minimizing pollution effects. (A8)

118-A. World Mining Developments in 1950. George O. Argall, Jr. *Mines Magazine,* v. 41, Mar. 1951, p. 35-38.

Includes brief report on Russia's mineral position and her metal and mineral gains as of 1950. Considers significant development in the "free-world" and analyzes what can be and is being done to offset our worsening mineral position. (A4, B10)

119-A. Treatment and Disposal of Plating Wastes. J. E. Cooper. *Sewage and Industrial Wastes,* v. 23, Mar. 1951, p. 295-306; disc. p. 307-308; *Plating,* v. 38, Apr. 1951, p. 346-352, 357.

Sources of plating wastes, disposal methods, suggested modifications in plating-room design, and various methods for cyanide treatment and disposal. Information on the Willow Run bomber plant and on Ford's new Monroe, Mich., plant. 27 ref. (A8, L17)

120-A. Steel for the Expanding Industry of California. Alden G. Roach. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 121-132.

Previously abstracted from *Blast Furnace and Steel Plant.* See item 58-A, 1951. (A4, A6)

121-A. The Pacific Northwest and Its Potentialities. H. H. Fuller. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 133-139.

Covers Oregon, Washington, Idaho, and Montana. Resources, industrial development, steelmaking, and transportation. (A4, ST)

122-A. The Steel Plant Laboratory, Its Function and Value. Stephen Bianco. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 141-149.

Function of the laboratory from raw materials through melting practice, deoxidation, chemical analysis, mill practice, and mechanical-property tests to final inspection. (A9, S general, ST)

123-A. Steel for Western Needs. John R. Zadra. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 151-158.

Origin of the Western steel industry and its development. (A4, ST)

124-A. The European Steel Situation. Clarence B. Randall. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 175-183.

Steel practices and production, raw materials, rationing, and scrap. The Schuman plan to pool all of the coke and steel producers of Europe and its possible effects in Europe and the U. S. (A4, ST)

125-A. Air Pollution Abatement in the Steel Industry. C. A. Bishop. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 245-261.

Air-pollution-abatement requirements for the steel industry as set forth in the Smoke Control Ordinance of Allegheny County, Pa., with emphasis on progress made in studying the openhearth, bessemer, and blast-furnace problem. (A7, D general, ST)

126-A. Mineral Resources of Japan Proper 1925-1945 (A Preliminary Report). *General Headquarters Supreme Commander for the Allied Powers (Tokyo), Natural Resources Section,* Report 44, 1946, 161 pages.

Covers abrasives, Al, Sb, As, asbestos, barite, Bi, Cd, cement, chromite, clay, Co, Cu, dolomite, fluorspar, Au, Ag, graphite, gypsum, iron, steel, limestone, lime, Mg, Mn, mica, Mo, Ni, phosphates, platinum-group metals, quicksilver, the salt industry, sand, gravel, silica, stone, sulfur, pyrites, talc, pyrophyllite, Sn, Ti, W, V, Zn, and Pb. (A4, B10)

127-A. Cobalt Resources in Japan. General Headquarters. *Supreme Commander for the Allied Powers, Natural Resources Section.* (Tokyo), Report 54, Aug. 31, 1946, 23 pages.

Four individual mines. Data on production and reserves. (A4, B10, Co)

128-A. Nickel Deposits in Japan. T. G. Andrews, compiler. *General Headquarters Supreme Commander for the Allied Powers* (Tokyo), *Natural Resources Section,* Report 57, Sept. 30, 1946, 22 pages.

Individual mines. 23 ref. (A4, B10, Ni)

129-A. Tungsten and Molybdenum Metallurgy of Japan. *General Head-*

quarters Supreme Commander for the Allied Powers (Tokyo), *Natural Resources Section,* Report 61, 1946, 33 pages.

Sources of raw materials, production, and uses. Describes beneficiation practices.
(A4, B10, B14, W, Mo)

130-A. Tungsten Resources of Japan. M. R. Klepper. *General Headquarters Supreme Commander for the Allied Powers* (Tokyo), Natural Resources Section, Report 77, Apr. 29, 1947, 31 pages.

Production and imports of tungsten, 1910-1945. Describes 8 individual mines. (A4, B10, W)

131-A. Mineral Resources of Southern Korea. *General Headquarters Supreme Commander for the Allied Powers* (Tokyo), *Natural Resources Section,* Report 84, July 28, 1947, 52 pages.

Alunite, arsenic, asbestos, beryl, coal, cobalt, copper, fluorite, gold, graphite, iron, lead, zinc, lithium, molybdenum, pyrophyllite, rare-element minerals, tungsten, and miscellaneous metals. (A4, B10)

132-A. Antimony Resources of Japan. *General Headquarters Supreme Commander for the Allied Powers* (Tokyo), *Natural Resources Section,* Report 92, 1947, 67 pages.

Domestic production and economy and foreign trade. Describes individual mines. 69 ref. (A4, B10, Sb)

133-A. Zinc Metallurgy in Japan. *General Headquarters Supreme Commander for the Allied Powers (Tokyo), Natural Resources Section,* Report 96, 1947, 56 pages.

Wartime allocations, specifications, prices, production costs, raw materials, and recovery processes. Includes tables and flow sheets. 18 ref. (A4, C general, Zn)

134-A. Iron Sand Resources of Japan. *General Headquarters Supreme Commander for the Allied Powers (Tokyo), Natural Resources Section,* Report 98, 1947, 32 pages.

Geographic distribution, production, stockpiles, prices, reserves, and geology. Describes mines, mining, milling, and metallurgical problems. 21 ref. (A4, B10, Fe)

135-A. Metallurgical Plants of Japan. *General Headquarters Supreme Commander for the Allied Powers (Tokyo), Natural Resources Section,* Report 137, 1950, 74 pages.

Locations and capacities of iron, steel, copper, lead, and zinc metallurgical plants in Japan. Includes all plants existing during the peak production years just before World War II. (A4, Cu, Fe, Pb, Zn, ST)

136-A. The Industrial Economics of Metallurgy. A. J. Murphy. *Engineer,* v. 191, Mar. 16, 1951, p. 343-345. (A condensation.)

Institute of Metals Presidential address. Present economic status and future prospects. Possible use of substitutes among the nonferrous metals. (A4, EG-a)

137-A. Evaluation of Industrial Wastes in Metal Processing Industries. David Milne. *Metal Finishing,* v. 48, Dec. 1950, p. 52-55, 76; v. 49, Jan. 1951, p. 65-69, 71.

The various waste liquids discharged during metal processing; ingredients considered injurious; degree of treatment necessary; methods commonly used for eliminating the objectionable character of the waste. 30 ref. (A8)

138-A. Steel Profits, Taxes, Sales Reach New Highs. John Delaney. *Iron Age,* v. 167, Apr. 12, 1951, p. 126, plus folded chart.

Financial data for 26 chief steel producers of the U. S., giving comparative figures for each for 1949 and 1950. These companies possess 92% of U. S. ingot capacity as of Jan. 1, 1951. (A4, Fe, ST)

139-A. Scrap: Industry's 5 Percenter. *Modern Industry,* v. 21, Apr. 15, 1951, p. 52-55.

Organization for more efficient scrap recovery. Typical examples of good systems. In most cases, large economic benefits are possible. (A8)

140-A. Where Did 1950's Steel Go? Here's the Breakdown. *Steel,* v. 128, Apr. 16, 1951, p. 54-55.

Tabular breakdown by metal form and by industry or end use.
(A4, ST)

141-A. (Book) **Technical Committee Activities.** 261 pages. 1950. American Iron and Steel Institute, 350 Fifth Ave., New York 1.

Contains addresses presented at regional technical meetings throughout 1950. Pertinent ones are abstracted separately.
(A general, D general, ST)

142-A. (Book) **De Re Metallica.** Georgius Agricola. (Translated by Herbert Hoover and Lou Henry Hoover). 672 pages. Reprinted 1950. Dover Publications, Inc., 1780 Broadway at 57th St., New York 19. $10.00.

Originally published in 1556 and translated by the Hoovers in 1912. It was the only authoritative text on the production of metals for almost 200 years and is still read for general scientific interest as well as its historical importance. (A2)

143-A. (Book) **The Behavior of Engineering Metals.** H. W. Gillett. 395

pages. 1951. John Wiley & Sons, 440 Fourth Ave., New York 18. $6.50.

Written for non-metallurgists, who must select metals and alloys for engineering uses. Metallurgical terminology, mechanical tests, properties, specifications, and detailed features of various steels, alloys, and other metals. Includes discussion of coatings, corrosion, and powder metallurgy. Chapter bibliographies. (A general)

144-A. (Book) **Industrial Plant Location. Its Application to Zinc Smelting.** Carl Hayden Cotterill. 155 pages. 1950. American Zinc, Lead & Smelting Co., 1600 Paul Brown Bldg., St. Louis 1, Mo. $5.00.

Factors considered are raw materials, labor, power and fuel, market area, transportation, capital sources, laws and taxes, technological requirements, all in their geographical variations. Shows how to determine the ideal location for a zinc smelter after weighing all the above factors. A case study demonstrates application of the principles. (A4, C21, Zn)

145-A. (Book) **F.B.I. Register of British Manufacturers.** Ed. 23. 852 pages. Nov. 1950. Kelly's Directories, Ltd., and Iliffe and Sons, Ltd., Dorset House, Stamford St., London S.E. 1, England. 42 s.

Provides a substantial cross-section of the most important producers of British goods in a wide range of industry. Compiled and classified for quick reference with major instructions and cross-references in English, French, and Spanish. Comprises 7 sections: a classified Buyer's Guide listing over 6,000 F.B.I. member firms under alphabetical trade headings; advertisements; addresses; trade associations; brands and trade names; trade marks; and addenda. (A10)

146-A. (Book) **L'Industrie Sidérurgique dans le Monde et son Evolution Economique depuis la Seconde Guerre Mondiale.** (The Iron and Steel Industry of the World and its Evolution Since the Second World War). 398 pages. Presses Universitaires de France, 108 Blvd. St.-Germain, Paris, France. 500 fr.

An economic study of the present status of the industry in each of the important producing countries. Resources, plants, programs, and potentialities of the industry, both in Iron Curtain countries and elsewhere. The problems of German industry. (A4, Fe, ST)

147-A. (Book) **Metalli Non-Ferrosi e Ferroleghe: Statistiche** (Non-Ferrous Metals and Ferroalloys: Statistics). 155 pages. 1950. Arienda Minerali Metallici Italiani, Rome, Italy.

Data on the production, foreign trade, prices, and consumption of nonferrous metals and ferro-alloys for Italy and the leading producing and consuming countries. (A4)

148-A. D-Enameling—A Method of Conserving Steel and Reducing Scrap Loss. Arthur M. Lander. *Better Enameling,* v. 22, Apr. 1951, p. 6-9.

Method of and reason for removing enamel from scrap steel. (A8, L12, ST)

149-A. Magnesium and Magnesia. *Mining Journal,* v. 236, Apr. 6, 1951, p. 316-318.

History and present production position in the United Kingdom. (A4, Mg)

150-A. The Aluminum Industry Investigations. *Modern Metals,* v. 7, Feb. 1951, p. 19-21, 23, 25, 27-29; Mar. 1951, p. 20-21, 23-24, 26, 29-30, 32, 36-38, 40, 42, 45-48; Apr. 1951, p. 24-25, 27-29, 31-32, 37-38, 41-44, 46.

Summarizes proceedings of House Monopoly Committee hearings covering shortages, expansion, imports, and sales. (A4, Al)

151-A. Operations Reflect Return of Crisis Economy. *Steel,* v. 128, Apr. 30, 1951, unpaged insert.

26th annual financial analysis of the steel industry, representing 95% of steelmaking capacity, presents financial data for 30 leading steel companies in the U. S. (A4, ST)

152-A. German Methods for the Recovery of Zinc From Galvanized Iron and Steel Scrap. E. R. Thews and M. Stromeyer. *Electroplating and Metal Finishing,* v. 4, Apr. 1951, p. 133-134. (Translated from *Metalloberfläche.*)

Previously abstracted from original under similar title. See item 313-A, 1950. (A8, Fe, Zn)

153-A. Stelco Expands. *Canadian Metals,* v. 14, Apr. 1951, p. 12-14.

Expansion of Steel Co. of Canada, Ltd. (A4, ST)

154-A. Blast Furnace Slag Building Materials. T. W. Parker. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 94, pt. 4, 1950-51, p. 192-225; disc. p. 225-233.

Compares utilization of slag in the U. S., Scotland, and Germany. An overall picture of a number of investigations carried out at the Building Research Station since 1934, on granulated slag for cements, foamed slag for light-weight concrete, and slag as a concrete aggregate. 14 ref. (A8)

155-A. The Mechanical Engineering Research Laboratory, East Kilbride, Scotland. G. A. Hankins. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 94, pt. 4, 1950-

51, p. 234-260; disc., pt. 5, p. 261-265.
Main purposes of the new laboratory will be basic and applied research in materials, mechanics of solids, mechanics of fluids, lubrication, mechanisms and metrology, formation and shaping of materials, and heat transfer. The way in which the work will be developed, and researches at present in progress in temporary accommodations. (A9)

156-A. More Aluminum for Defense: How Natural Gas Makes More Sheets. Arthur Q. Smith. *Gas Age,* v. 107, Apr. 26, 1951, p. 67-70, 100-102.
Procedures and equipment of Alcoa's new plant at Davenport, Iowa. Emphasis is on gas-fired equipment. (A5, F23, Al)

157-A. Recent Furnace Installations by Alcoa for Production and Fabrication of Aluminum. Part I. Aluminum Ore Reduction at Point Comfort, Texas. *Industrial Heating,* v. 18, Apr. 1951, p. 610, 612, 614, 616, 618, 626.
(A5, B14, Al)

158-A. U. S. Foreign Trade in Iron and Steel. J. Joseph W. Palmer. *Foreign Commerce Weekly,* v. 43, May 14, 1951, p. 3-5.
Statistical comparison of 1949 and 1950, also some data for Jan. and Feb. 1951. (A4, Fe, ST)

159-A. Metal Recovery by Cation Exchange. A. B. Mindler, M. E. Gilwood, and G. H. Saunders. *Industrial and Engineering Chemistry,* v. 43, May 1951, p. 1079-1081.
Two unique processes for recovery of Sn and Zn from solutions. This work was undertaken to contribute to the solution of waste-disposal problems, conservation of strategic metals, water, and heat values. Results indicate that it is possible to employ ion exchange for recovery of tin from electroplating operations using alkaline baths. Also some preliminary data on removing and recovering Zn from relatively concentrated H_2SO_4 solutions.
(A8, Sn, Zn)

160-A. Copper—The Problem and Prospects. *Westinghouse Engineer,* v. 11, May 1951, p. 74-80.
An illustrated economic survey and forecast. (A4, Cu)

161-A. Library Use of New Indexing System. David L. Edelman. *Metal Progress,* v. 59, Apr. 1951, p. 526-528.
Experiences of past year, in the Division of Metallurgical Research, Kaiser Aluminum & Chemical Corp., with use of the ASM-SLA Metallurgical Literature Classification and punched-card system.
(A general, U8)

162-A. Light Metals in Heavy Demand. Clyde Williams. *Monthly Business Review,* v. 33, May 1951, p. 12.
Supply and demand situation, recent expansion in applications, and future prospects. (A4, Al, Mg)

163-A. Predicts Sharp Reduction in U. S. Lead Supply This Year With Imports Cut About 50 Per Cent. William B. Clancy. *Metals,* v. 21, Apr. 1951, p. 9, 12, 18.
(A4, Pb)

164-A. Integrated Waste Treatment System for the Electroplating Industry. Leslie E. Lancy. *Metal Finishing,* v. 49, Feb. 1951, p. 56-59.
A new system, on which a patent application is pending. 26 ref.
(A8, L17)

165-A. Recovery of Chromic Acid From Plating Rinse Waters. E. W. Neben and W. F. Swanton. *Plating,* v. 38, May 1951, p. 457-460, 470.
A package unit composed of glass-lined and stainless steel equipment for recovering waste. Economics of the process are analyzed in detail, and an equation for net annual profit is presented. Several examples of how to select the proper size unit and how to estimate net annual profit or amortization period.
(A8, L17)

166-A. Metals. William F. Boericke. *Automotive Industries,* v. 104, May 1, 1951, p. 55, 90, 92.
Price, supply, and demand situation: British advance metal prices; Zn demand continues strong; Sn outlook clouded; Pb prices may head upwards; little change in Cu; and peak demand for steel in May. (A4)

167-A. A Review of World Coal and Iron Ore Resources and Their Utilization for Manufacture of Steel. Part III. Steel Production of Various Nations—Major Steel Producers. Part IV. Other Minor Steel-Producing Nations. W. C. Rueckel. *Blast Furnace and Steel Plant,* v. 39, Apr. 1951, p. 426-438; May 1951, p. 540-548.
Includes bar graphs and maps. 15 ref. (A4)

168-A. An Accounting of World Mining for 1950. Charles Will Wright and John Beaupre Dorsh. *Mining World,* v. 13, Apr. 15, 1951, p. 27, 29-35.
An economic summary.
(A4, B12)

169-A. Metals and Minerals Review. *Mining World,* v. 13, Apr. 15, 1951, p. 37-44, 46-51.
The following brief articles review economic developments of 1950: "Aluminum," Donald M. White; "Antimony," James P. Bradley; "The Atom," staff of AEC's Raw Materials Operations Office; "Beryllium," D. H. Hershberger; "Cobalt," Howard Waldron; "Copper," W. W. Lynch; "Fluorspar," C. O. Anderson; "Gold," Neil O'Donnell; "Iron Ore,"

Verne D. Johnston; "Lead," George Mixter; "Manganese," J. Carson Adkerson; "Molybdenum," C. M. Loeb, Jr.; "Nickel," John F. Thompson; "Oil Shale," Boyd Guthrie; "Phosphate," Louis Ware; "Potash," H. B. Mann; "Perlite," E. P. Chapman, Jr., and John A. Wood; "Platinum," C. W. Engelhard; "Quicksilver," J. Eldon Gilbert; "Silver," E. W. Conrad; "Tin," Robert J. Nekervis; "Tungsten," Worthen Bradley; "Titanium," Joseph H. Reid; and "Zinc," Ernest V. Gent. (A4)

170-A. United States Mining Report. *Mining World,* v. 13, Apr. 15, 1951, p. 55-62, 64-72.

Economic survey by states, territories, and areas. (A4, B12)

171-A. World-Wide Mining Report. *Mining World,* v. 13, Apr. 15, 1951, p. 73, 76-77, 79-80, 83, 85, 87-88, 90, 94-95, 97-100, 102, 104, 106.

Economic survey by areas and countries. (A4, B12)

172-A. Directory of Active Mining Operations. *Mining World,* v. 13, Apr. 15, 1951, p. 1D-46D, 163.

List of American mining properties presented alphabetically by states. Listings are made under the name of the operating company, the mine or the individual operator, depending upon the name under which the property is operated or commonly known. The list was compiled after a careful survey of some 6,000 mines and prospects, both active and dormant, in the U. S. and Alaska. (A10, B12)

173-A. Blast Furnace Lime as Plant Food. (In German.) Wolfgang Elbert. *Stahl und Eisen,* v. 71, Apr. 12, 1951, p. 391-393.

Finely-ground blast-furnace slag not only replenishes the lime in the soil, but also adds trace elements indispensable to the growth of vegetation. (A8)

174-A. (Book) **Metallurgy in Antiquity; A Notebook for Archeologists and Technologists.** R. J. Forbes. 480 pages. E. J. Brill, Oude Rijn, 33a Leiden, Holland. 19 guilders.

Surveys beginnings and development of metal winning and working from 7000 B.C. to 1400 A.D. Covers Au, Ag, Pb, Sn, Sb, As, Zn, brass, Cu, and Fe. Extensive chapter bibliographies. (A2)

175-A. (Book) **Materiaux de Construction Mécanique.** (Engineering Materials.) H. Wiegand. 304 pages. 1951. Dunod, 92 Rue Bonaparte, Paris 6, France. $7.50.

Translated into French, from the original German. Covers problems facing the design engineer. Without getting into the field of metallurgy, except where absolutely necessary, it describes the characteristics and composition of the various materials and operations which change their properties. (A general)

176-A. Some Principal Sources of Gold and Silver. David N. Skillings. *Skillings' Mining Review,* v. 40, May 26, 1951, p. 1, 4.

Includes tabulation of outputs of 32 companies. (A4, Au, Ag)

177-A. Recovery of Sulfurous Gases Formed During Smelting of Copper Ores. (In Italian.) Edmondo Schmidt di Fridberg. *Metallurgia Italiana,* v. 42, Dec. 1950, p. 473-478.

In particular the amount of SO_2 which may be recovered from converters. Flow sheet of proposed installation. Economic aspects. (A8, C21, Cu)

178-A. The Great Aluminum Farce. *Fortune,* v. 18, June 1951, p. 92-98, 176, 179, 181-182, 184.

Political and economic aspects of the present Al shortage, and the Al industry's expansion to overcome it. Advantages of buying Al from Canada, instead of attempting to produce it all in the U. S. at higher cost. (A-4, Al)

179-A. Disposal of Plating Room Wastes. III. Cyanide Wastes: Treatment With Hypochlorites and Removal of Cyanates. Barnett F. Dodge and Walter Zabban. *Plating,* v. 38, June 1951, p. 561-566, 571-586.

Experimental work on three treatment processes that appear to be the most promising. Oxidation by hypochlorite ion is the best known and most widely practiced of the methods. 19 ref. (A8, L17)

180-A. Metallurgical Laboratories Harold K. Work. "Laboratory Design" (Reinhold Publishing Corp., New York), 1951, p. 191-194.

Recommended design and facilities. General features, metallographic equipment, mechanical testing equipment, melting facilities, heat treating facilities, shaping of metals, miscellaneous allied laboratories, and layout. (A9)

181-A. Rank of L. S. Iron Ore Producers in 1950. *Skillings' Mining Review,* v. 90, June 2, 1951, p. 1, 7.

Data on tonnage of shipments made by 24 operating companies from 171 mines. (A4, Fe)

182-A. Grades of Iron Ore Shipped from L. S. Region, 1950. David N. Skillings. *Skillings' Mining Review,* v. 40, June 9, 1951, p. 1, 4, 15.

Tonnages and average analyses for the various U. S. and Canadian ranges. (A4, B10, Fe)

183-A. First Exploratory Effort in World Metallurgy. A. H. Allen. *Steel,* v. 128, June 11, 1951, p. 76-77, 104.

Plans for World Metallurgical

Congress to be held in Detroit, Oct. 15-19, 1951. Technologists, scientists, production executives and sales engineers in producing and fabricating industries will join in a global conference to examine conservation, utilization and substitution of strategic metals; to share scientific knowledge, technical and business skills. (A3)

184-A. Thirty-first Annual Report, *British Non-Ferrous Metals Research Association,* Apr. 1951, 64 pages.

Includes review of research progress. (A9, EG-a)

185-A. Spanish Iron and Steel Industry. *Foundry Trade Journal,* v. 90, May 24, 1951, p. 559.

Present and future prospects. (A4, Fe, ST)

186-A. The Yugoslavian Aluminum Industry. (In French.) G. A. Baudart. *Revue de l'Aluminium,* v. 28, Apr. 1951, p. 121-122.

Recent development and future plans. (A4, Al)

187-A. Review of Iron and Steel Literature for 1950. Morris Schrero. *Blast Furnace and Steel Plant,* v. 39, June 1951, p. 688-690, 731.

34th annual review attempts to list books and pamphlets published during 1950, with some of earlier date not included in the previous review. (A10)

188-A. Recent Developments in Casting Alloys. *Chemical Age,* v. 64, June 2, 1951, p. 849-850.

British reluctance to adopt new methods. (A5)

189-A. More Tonnage for Titanium. *Chemical Week,* v. 68, June 16, 1951, p. 14-15.

Entry of Crane Co. into the Ti-production business. Its ton-a-week goal will rival the 1950 production (60 tons) of DuPont and National Lead. But they will turn out 500 tons this year, will hit a rate of 5,000 tons by end of 1952. Properties, processes, and future outlook. (A4, Ti)

190-A. A Method for Disposal of Acid and Alkaline Plating Room Wastes. J. H. Monaweck and Clyde Kelly. *Products Finishing,* v. 15, June 1951, p. 38, 40.

Mixing procedure. (A8, L17)

191-A. Where We Stand on Strategic Materials: Nonferrous Materials. *SAE Journal,* v. 59, June 1951, p. 18, 21-24 (Excerpts from "Where Do We Stand on Nonferrous Strategic Materials?" by Richard J. Lund.)

Highlights of the supply-demand picture, stockpiling, controls, foreign developments, and future prospects for Cu, Pb, Zn, Al, Sn, Co, Cd, and diamonds.

(A4, Cu, Pb, Zn, Al, Sn, Co, Cd, C-b)

192-A. Where We Stand on Strategic Materials: Ferrous Metals. *SAE Journal,* v. 59, June 1951, p. 19-21 (Based on "Status of Ferrous Strategic Materials—Government and Industry Situation and Rulings," by E. C. Smith.)

Economic analysis of present status and future prospects for ferrous materials in the U. S. Includes analysis of the alloying-element situation, specifically for Mn, Cb, V, Mo, Ti, W, Cr, Ni, and Co. (A4, Fe, ST)

193-A. Design and Research Centre for the Gold, Silver and Jewellery Industries; An Experiment in Cooperative Industrial Development. G. E. Gardam. *Research,* v. 4, June 1951, p. 274-279.

Facilities and some of the work of a British organization. (A9, T9, Ag, Au)

194-A. (Book). **The Story of Metals.** John W. W. Sullivan. 290 pages. 1951. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio; and Iowa State College Press, Ames, Iowa. $3.00.

One of a "Series for Self-Education." Progress of metal discovery and treatment from the Stone Age to modern times. Modern industrial treatment for the more common metals. Includes discussion on the origin of the earth and formation of mineral deposits, and a final, speculative chapter on future uses of metals. (A2, B general, C general, D general)

195-A (Book) **World Resources and Industries.** Rev. Ed. Erich W. Zimmerman. 832 pages. 1951. Harper & Bros., New York.

A comprehensive appraisal including an introduction to the study of resources such as food, fibres, trees, crops, minerals, ores, coal, petroleum and gas. Includes discussion on the iron and steel industry and other metal industries, and nonmetallic and chemical industries. Extensive chapter bibliographies. (A4, B10)

196-A (Book). **Laboratory Design.** H. S. Coleman, editor. 393 pages. 1951. Reinhold Publishing Corp., 330 West 42nd St., New York.

A National Research Council report on design, construction, and equipment of laboratories. Consists of 42 papers grouped under the broad headings: materials, facilities, services, and equipment; teaching laboratories; industrial laboratories; and some modern laboratories. One of the latter group is a description

by W. A. Welcker of the research buildings of Battelle Memorial Institute. Also includes a brief bibliography and an index. One paper of metallurgical interest is abstracted separately. (A9)

197-A. Copper—Our Current and Future Needs and Supply. Charles A. Scarlott. *Materials & Methods,* v. 33, June 1951, p. 61-65.

An economic analysis. (A4, Cu)

198-A. Utilizing Machines to Fullest Extent at Seattle Port of Embarkation. Howard E. Jackson. *Modern Industrial Press,* v. 13, June 1951, p. 36, 38, 40, 42.

Large variety of work done by a few machines, including lift truck, press brake, band saw punch, circle cutter, roll pneumatic drum sander, and welding apparatus.
(A5, G general, K general)

199-A. First Boston Surveys the North American Aluminum Industry. *Modern Metals,* v. 7, June 1951, p. 37-40.

Analysis compiled by the First Boston Corp. of New York, a leading dealer and broker in bonds and securities. A concise review of the industry's chief features—history and growth, markets, competition, outlook, and a "profile" of each of the four North American producers.
(A4, Al)

200-A. The Tin Research Institute. *Engineer,* v. 191, June 8, 1951, p. 757.

New laboratory opened on May 31, 1951, located at Greenford, Middlesex, England. (A9, Sn)

201-A. The Treatment of Liquor From Continuous Strip Pickling Lines. J. Pearson. *Sheet Metal Industries,* v. 28, June 1951, p. 501-516.

How "spent" liquor of high acid strength is treated to recover H_2SO_4, then disposed of. 27 ref. (A8, L12)

202-A. The Problem of Iron and Steel. *Engineering,* v. 171, June 8, 1951, p. 683-684; June 15, 1951, p. 715-716.

An economic analysis covering not only Britain and her dominions, but the U. S., Russia, and other countries. (A4, Fe, ST)

203-A. The Steel Outlook for the Near Future. Benton J. Willner. *Finish,* v. 8, July 1951, p. 33, 58-59.

Economic analysis and forecast. (A4, ST)

204-A. Direct Extrusion Applied to Light Metal Scrap. Max Stern. *Iron Age,* v. 167, June 28, 1951, p. 71-73.

Dispersion of oxides, destruction of chip layers, and almost normal properties were obtained in bars extruded at about 750° F. and 15 tons per sq. in. Rounds, profiles, and notched ingots for deoxidation of steel can be produced at or near the point of origin of Al scrap. Diagram shows design of rotary furnace and extrusion press for continuous production of bar stock from scrap.
(A8, F24, Al)

205-A. Diamonds From Dust. R. S. Young and A. D. McDonald. *Iron Age,* v. 167, June 28, 1951, p. 76-77.

With diamond powder worth $7 a gram, recovery from metal waste piles has become very attractive. Wet separation is more effective than dry separation; however, other media than water are used.
(A8, C-b)

206-A. Nickel in 1950; Review of World Demand and Output. *Iron and Steel,* v. 24, June 15, 1951, p. 234.

Based on talk by John F. Thompson, president of International Nickel Co. of Canada. (A4, Ni)

207-A. Recovery of Zinc Wastes—Former Uneconomic Processes Now Possible. *Times Review of Industry,* v. 5, June 1951, p. 24.

Neglected scrap and residues and their possibilities of treatment.
(A8, C21, Zn)

208-A. Castle Industries Inc., Seattle: A Case Study of a Sub-Contractor. Howard E. Jackson. *Western Metals,* v. 9, June 1951, p. 33-35.

Factory does airframe subassembly work. Layout, equipment, methods, materials, and restrictions.
(A5, T24, SS, Al)

209-A. The Laboratory of the Mond Nickel Co., Ltd., at Birmingham. (In French.) *Métaux Corrosion Industries,* v. 26, Apr. 1951, p. 170-178.

Facilities and activities. (A9, Ni)

210-A. Review of Iron and Steel Literature For 1950. Part II. (Concluded.) Morris Schrero. *Blast Furnace and Steel Plant,* v. 39, July 1951, p. 813-816, 823-824, 850.

(A10, Fe, ST)

211-A. Aluminium Casting Alloys; Quality Production From Secondary Materials. F. H. Smith. *Metal Industry,* v. 78, June 15, 1951, p. 479-482; June 22, 1951, p. 502-503; June 29, 1951, p. 525-526. (A condensation.)

Equipment and procedures used in Britain. (A8, Al)

212-A. (Book) Watkins Cyclopedia of the Steel Industry. Ed. 3. 494 pages. 1951. Steel Publications, Inc., 4 Smithfield St., Pittsburgh 30, Pa.

Chapters cover steel industry; coal and coke; iron ore; manufacture of iron; steel-melting processes; rolling and shaping of steel; carbon and alloy steels; forging, forming, and finishing steel; joining of steel; and heat treatment of steel.
(A general, ST)

213-A. Scarce Metals. James E. Payne. *Steelways,* v. 7, July 1951, p. 1-5.

The acute shortage of some of the basic alloying metals needed to build our war machine and to maintain today's civilian production. Sources throughout the world and what is being done to alleviate the problem. (A4, EG-a)

214-A. 1951 Brass Mill Production Viewed as Entirely Dependent on Available Copper, Zinc, and Scrap. T. E. Veltfort. *Metals,* v. 22, July 1951, p. 9-18.

Economic forecast. (A4, Cu)

215-A. World Outlook for Zinc Indicates Continuing High Demand With Pressure for Higher Prices. R. L. Wilcox. *Metals,* v. 22, July 1951, p. 7-8, 12, 19.

An economic analysis. (A4, Zn)

216-A. Scrap Iron and Steel. Edwin C. Barringer. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 50-55.

Surveys sources. Emphasizes importance as a raw material in iron and steel production. (A8, Fe, ST)

217-A. Metallurgy in the Nineteenth Century. Harold K. Work. *Journal of Chemical Education,* v. 28, July 1951, p. 364-368.

Reviews history and developments. Gives production figures in various metals fields. (A4)

219-A. Foundries Join in Developing Cupola Emission Control Unit. Thomas L. Harsell, Jr. *American Foundrymen,* v. 20, Aug. 1951, p. 42-44.

Tests for particulate matter emissions conducted on three representative cupolas in the Los Angeles area, and various types of dust-collection equipment used. A full-scale wet washer was installed, and the system was later redesigned to include a second washer, water-cooling tower, and baghouse. The dust loss was within the allowable limit. (A5, E10)

220-A. The Utilization of Pollutive Wastes in the Process Industries. D. F. Othmer, M. D. Weiss, and R. S. Aries. *American Society for Mechanical Engineers,* Advance Paper 51-PRI-11,, 1951, 7 pages.

Use of pollutive wastes in the fermentation, food, iron, steel, petroleum, pulp, and paper industries. (A8)

221-A. The Long-Term Prospects for Essential Minerals. Richard L. Meier. *Bulletin of the Atomic Scientists,* v. 7, Aug. 1951, p. 214-216. (A4)

222-A. Report on the British Atomic Energy Research Establishment. *Bulletin of the Atomic Scientists,* v. 7, Aug. 1951, p. 229-233.

Leaders of five departments at Harwell, England's laboratory for atomic-energy development, describe the work of their groups: "Physics," T. G. Pickavance; "Chemistry," H. A. C. McKay; "Metallurgy," P. C. L. Pfeil; "Chemical Engineering," A. S. White; and "Biology," J. F. Loutit. (A9)

223-A. Plating Room Chlorinator Solves Cyanide Disposal Problem. N. S. Chamberlin. *Metal Finishing,* v. 48, Aug. 1951, p. 54-55, 58.

New type of apparatus and procedure. (A8, L17)

224-A. Some Large Zinc Producers in 1950. David N. Skillings. *Skillings' Mining Review,* v. 40, Aug. 25, 1951, p. 1, 10-11.

New developments and activities of the various large producers. (A4, Zn)

225-A. Can Industry Use Television? *Fortune,* v. 44, Sept. 1951, p. 120-123, 136, 141-142, 146.

Several examples of use in the steel industry, in the power plant, and in surgery. Future prospects. (A5)

226-A. The Economic Utilization of Waste Gases by the Integration of Base Metal and Chemical Fertilizer Operations at Trail, B. C. W. S. Kirkpatrick. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 962-977: disc., p. 1047-1093.

Closely integrated metallurgical and chemical operations of Consolidated Mining and Smelting Co. of Canada, Ltd. The company, primarily a producer of Pb and Zn, was faced with an atmospheric-pollution problem caused by the large quantities of SO_2 gas in their metallurgical waste gases. Recovery and economic disposal of the SO_2 was accomplished by construction of a large-scale fertilizer plant. (A8, Pb, Zn)

227-A. The Present Metallurgical Bases of Austrian Iron and Steel Production. Bernhard Matuschka. *Journal of the Iron and Steel Institute,* v. 168, Aug. 1951, p. 343-345.

Shows that good conditions exist for production of a large proportion of high-quality steel. Plans for the future production of steel in Austria, and a brief comparison between expected distribution in Austria, once a new plant now being constructed at Donawitz and Linz is in operation, and production in Europe as a whole. (A4, D general, Fe, ST)

228-A. Organizing an Engineering Data File for Maximum Utility in Solving Design Problems. A. F. Gagne, Jr. *Machine Design,* v. 23, Sept. 1951,

p. 110-116, 196.
An effective reference data classification system. (A10)

229-A. Current Russian Metallurgical Texts. Carl A. Zapffe. *Metal Progress*, v. 60, Aug. 1951, p. 78-80, 100, 102, 104, 106, 108, 110, 112, 114, 116.
A series of extensive reviews of Russian metallurgical books published in the last few years. Emphasizes the growing importance of Russian technical literature. (A3)

230-A. Price Curbs Diverting Foreign Lead From U. S.; Gov't May Buy Metal Abroad and Resell at Loss. Felix Edgar Wormser. *Metals*, v. 22, Aug. 1951, p. 7-8, 10, 18.
Believes that tariff suspension would give consumers little aid as long as world market quotations continue to be above domestic ceiling. (A4, Pb)

231-A. Gov't Regulations Almost Sole Determinant in Predicting Zinc Die Casting Industry Outlook. David Laine. *Metals*, v. 22, Aug. 1951, p. 9-10.
Effects of limitations on use of steel, copper and nickel in pyramiding effect of restrictions on Zn; 1951 volume is seen unchanged from 1950. (A4, Zn)

232-A. Recovery of Very Fine Metal Dusts Pays. Peter J. Lloyd. *Plant*, v. 4, Sept. 1951, p. 50-52.
Aerodynamic type collector system and its use by S. K. Wellman Co., Cleveland, to recover Cu and other powdered metals used in production of sintered bearings. (A8)

233-A. Defense Program Alters Steel Distribution Pattern. *Steel*, v. 129, Sept. 17, 1951, p. 66-67.
The distribution pattern during the first half of 1951. Auto industry gets a smaller proportion of mill shipments, while ordnance and rail transportation groups receive more. (A4, ST)

234-A. Inerting Oil Tankers for Safe Welding. Will Cooper. *Welding Engineer*, v. 36, Sept. 1951, p. 56-58, 60, 104-106.
Use of CO_2 to prevent a fire or an explosion while a vessel transporting petroleum products undergoes a welded repair. (A7, K general)

235-A. Britain's Newest Steelworks Opened; Steel Company of Wales Project Materializes. *Metallurgia*, v. 44, Aug. 1951, p. 63-68.
Post-war reconstruction includes improvements made on existing plants of Steel Co. of Wales as well as the new plant at Abbey Works. (A5, ST)

236-A. (Book) **The American FIAT Review of German Science. Vol. 31. General Metallurgy.** Max Hansen, editor. 385 pages. 1950. O. W. Liebiger Research Laboratories, Petersburg, N. Y.
This translation of the German edition contains nine comprehensive review articles in various branches of metallurgy. The articles are individually abstracted in appropriate sections of the Apr. 1951 Review of Metal Literature. (A general)

237-A. (Book) **Annual Statistical Report for 1950; American Iron and Steel Institute.** Vol. 39. 100 pages. 1951. American Iron and Steel Institute, 350 Fifth Ave., New York.
Statistics relating to the iron and steel industry of the U. S. and Canada for the year 1950, together with comparable figures for some preceding years. Includes figures for geographical districts showing production by blast furnaces, steelmaking furnaces, and of rolled and other finished products. (A4, Fe, ST)

238-A. (Book) **Company Testimony Before Presidential Factfinding Board, Steel Industry Case: August 1949.** 4 Vols. 2106 pages. 1950. Steel Wage Case Steering Committee.
Verbatim report on the testimony, arranged alphabetically by company name. A Presidential Factfinding Board held hearings on the labor-management dispute concerning a new contract. (A6, ST)

239-A. (Pamphlet) **Report on the Work of the Tin Research Institute, 1950.** *Tin Research Institute*, 1951, 32 pages.
Surveys the general development activities in various countries. Some of the laboratories and workshops and the work being done. (A9, Sn)

240-A. Blast Furnace Slags as Agricultural Liming Materials. O. R. Carter, B. L. Collier, and F. L. Davis. *Agronomy Journal*, v. 43, Sept. 1951, p. 430-433.
How blast-furnace slag is of value as an agricultural liming material. In most cases, slag is as efficient in crop production as limestone when applied on an equivalent basis. Slag contains small amounts of boron and other essential minor elements. 17 ref. (A8, D1)

241-A. Review of Iron and Steel Literature for 1950. Part III. Morris Schrero. *Blast Furnace and Steel Plant*, v. 39, Sept. 1951, p. 1101-1105.
Literature pertaining to corrosion, cleaning, protective coating, and foundry is listed. Also U. S. Government publications relating to the iron and steel industry. (A10, Fe, ST)

242-A. What Can U. S. Do About Copper? *Business Week*, Sept. 29, 1951, p. 100-102, 104.
Problems of Cu supply in the

U. S. Shows graphically that domestic output is not rising and that imports are falling. (A4, Cu)

243-A. Statistical Review of Canada's Mining Industry, 1950. H. McLeod. *Canadian Mining and Metallurgical Bulletin,* v. 44, Sept. 1951, p. 621-627; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 399-405.

Reviews Canada's mining and industry for 1950 under the following topics: industrial production and national income, mineral production, and exports of nonferrous metals (1939 and 1950). (A4)

244-A. The Research Engineer in the Iron and Steel Industry. Frances Mortimer. *Engineer,* v. 192, Sept. 14, 1951, p. 344-346.

Procedures carried on by the engineering division of the British Iron and Steel Research Assoc. Various projects undertaken. (A9)

245-A. Metals for the High-Speed Age. John D. Sullivan. *Engineering and Mining Journal,* v. 152, Sept. 1951, p. 82-84.

Materials used in jet turbines, electronics, and similar new applications. Future supplies of critical materials are considered. (A4, T general)

246-A. What is the Outlook for Materials? Panel of Experts Discusses Supply Situation. *Industrial Gas,* v. 30, Sept. 1951, p. 14-15, 30.

Panel discussion under the following headings: pattern of metal use, steel manufacturing capacity, nonferrous and light metals, organic and heavy chemicals. A chart illustrates U. S. consumption and production of some vital materials. (A4)

247-A. Aluminum: Growing Giant in Metal Scene. Bob Hatschek. *Iron Age,* v. 168, Sept. 20, 1951, p. 71-72.

Future markets for Al. A factor affecting commercial production is the need of low-cost electrical power. (A4, Al)

248-A. Aluminum Scrap Recovery Saves 5 Million Lb. Herbert Chase. *Iron Age,* v. 168, Sept. 27, 1951, p. 94-98.

Since all Chrysler cars use cast aluminum alloy pistons that are finished in the corporation's own plants, a sizable tonnage of chips results from machining operations. The recovery procedure. (A8, Al)

249-A. Magnesium Alloy Dust Collection. *Light Metals,* v. 14, Sept. 1951, p. 508-509.

A unit dust collector called "Multiswirl" designed to handle Mg could adequately handle metallic Ti and Zr dust. (A8, Mg)

250-A. The Inquisitive Steelman. James E. Payne. *Steelways,* v. 7, Sept. 1951, p. 1-4.

The importance of research in the phenomenal rise in quantity and quality of steel production. (A9, ST)

251-A. Costs Cut by Simplified Welding Operations. Howard E. Jackson. *Industry & Welding,* v. 24, Oct. 1951, p. 52-54, 59, 108-109.

How factory-wide simplicity is achieved by use of expandable type buildings and fabricating production lines, and by efficient plant layout and low cost handling procedures. (A5, K general)

252-A. Uncle Sam Wants to Buy These Aluminum Products. Part I. *Iron Age,* v. 168, Oct. 4, 1951, p. 236-238.

A list of products needed by the armed services with information on how to obtain orders to make these items. (A4, Al)

253-A. Modern Industries Depend on Electroprocesses. Charles L. Faust. *Journal of the Electrochemical Society,* v. 98, Oct. 1951, p. 133C-137C.

Dependence of industries on electroprocesses. Tables show the products made from the process and some of the major industries involved. (A4)

254-A. One World in MetaHurgy. *Steel,* v. 129, Oct. 8, 1951, p. 116-119, 172, 175, 178.

Symposium on some of the thinking, prejudices, desires and confusions occupying the attention of leading metals specialists in the world. Based on interviews with conferees to the World Metallurgical Congress in Detroit. (A general)

255-A. Who Has the World's Metals. *Steel,* v. 129, Oct. 8, 1951, p. 120-124, 143, 146, 148, 150, 152, 154, 158, 161-162, 164, 166, 169.

Data on world mine production of metals. Sources of new supplies, prices and uses of imported metals. (A4, B10)

256-A. Steel Industry Statistics. *Steel,* v. 129, Oct. 1, 1951, p. 121-136.

Tabulated data on pig iron, coke, steel ingots, and finished steel production by companies and plant location. Canadian statistics are included. (A4, ST, Fe)

257-A. Reshuffle of Steel's Top-Dog Ratings. *Business Week,* Oct. 13, 1951, p. 102.

Chart shows prewar, postwar and the present standing of steel producers. (A4. ST)

258-A. Copper—Supply and Demand. *Stove Builder,* v. 16, Oct. 1951, p. 60, 64, 66, 68, 70.

Economic analysis. (A4, Cu)

259-A. Industrial Metallurgy at Birmingham University. Foreword. A. J. Murphy. *General Organization:* **Metal Working Section.** A. R. E. Singer. **Melting and Casting Section of the Aitchison Laboratory.** V. Kondic. *Metal Industry,* v. 79, Sept. 21, 1951, p. 235-239, 243; Sept. 28, 1951, p. 263-265.

General facilities in the laboratories of the university which were designed to enable both teaching and research to proceed simultaneously. Metal-working equipment is described in detail. (A3)

260-A. Crisis in Metallurgy. Georg Masing. *Metal Industry,* v. 79, Sept. 28, 1951, p. 257-259.

The conflict of theoretical and technological trends. The widening gulf between the two approaches is not limited to Germany, but is even more strikingly apparent in America. Recommendations for reversal of this trend. (A3)

261-A. The British Iron and Steel Research Association. *Metallurgia,* v. 44, Sept. 1951, p. 125-128.

Work of various divisions of this association in ironmaking, steelmaking, mechanical working, plant engineering, and metallurgy. (A9, D general)

262-A. The British Non-Ferrous Metals Research Association. W. L. Hall. *Metallurgia,* v. 44, Sept. 1951, p. 129-132.

Progress made in long-range researches as well as special steps taken to assist industry in its efforts to economize in the use of certain metals and to find substitutes. 27 ref. (A9, EG-a)

263-A. Iron and Steel Industry in India. P. E. Mehta. *Metal Progress,* v. 60, Oct. 1951, p. 93-96, 218, 220, 222, 224.

Includes raw-material sources and map. (A4, B10, ST)

264-A. Russian Metallurgical Texts. N. H. Polakowski. *Metal Progress,* v. 60, Oct. 1951, p. 108-109.

Discusses recent article by Zapffe (item 229-A, 1951). Criticizes the quality of Russian metallurgical work. Several specific points indicate that the Russians are considerably behind the Western nations in metallurgy and metalworking. (A3)

265-A. Steel Company of Wales. *Sheet Metal Industries,* v. 28, Sept. 1951, p. 789-808.

Details of plant and equipment. The production of steel sheets is outlined step-by-step. (To be continued). (A4, ST)

266-A. (Book) **Mechanische Technologie.** (Mechanical Technology). A. Kopecky and R. Schamschula. 363 pages. 1951. Springer-Verlag, Vienna, Austria.

The present status of metals and other materials, their properties and structures, forming, heat treating, methods of testing and measurement and of applying surface coatings. (A general)

267-A. (Book) **Guide to Foreign Sources of Metallurgical Literature.** John T. Milek. 95 pages, 1951. Richard Rimbach Associates, 921 Ridge Ave., Pittsburgh 12, Pa. $2.50.

Nine sections give lists of foreign metallurgical associations, societies, institutions; periodicals, transactions, proceedings; metallurgical abstract services; foreign standardizing organizations; statistical sources; directories of metallurgical industries; metallurgical books; bibliographies, technical and special reports; and metallurgical abbreviations. (A10)

268-A. (Book) **The Metallic Raw Materials: Their Occurrence and Economic Importance. Vol. 9. Lead and Zinc.** (In German.) C. Berg, F. Friedensburg and H. Sommerlatte. 468 pages. 1950. Ferdinand Enke Publishing House, Hasenbergersteige, Germany. Stitched, 70 D. M.; Bound, 73.50 D. M.

Divided into two main sections: "General," and "Individual Countries." The first section contains chapters on the concentration and smelting of Pb-Zn ores, and on uses and history of the two metals. The second section forms the major part of the book and covers 63 countries. (A4, B general, C21, Pb, Zn)

269-A. (Book) **Year Book of the American Bureau of Metal Statistics.** Ed. 30. 112 pages. 1951. American Bureau of Metal Statistics, 50 Broadway, New York City. $3.00.

Covers largely the same field as previous issues. Statistics relating to copper, lead and zinc, gold and silver and other nonferrous metals. (A4, EG-a)

270-A. (Book) **Handbuch der Deutschen Wissenschaft.** (Handbook of German Science.) Vols. I and II. 1561 pages. 1949. Fr. K. Koetschan Verlag, Berlin, Germany.

Vol. I lists libraries and personnel of German universities, technical schools, medical, theological and law schools, and gives pertinent information on scientific institutes, museums, libraries, archives, societies, and journals. Vol. II contains an alphabetical listing of personnel (with brief personal facts and publications, and listings according to field of endeavor. (A10)

271-A. Research Is Important to United States Pipe & Foundry Co. Edwin Bremer, Julian B. McFarland. *Foundry,* v. 79, Nov. 1951, p. 88-91, 198.

Equipment and procedures of research and development department of above firm. Various phases of metallurgy and metalworking of ferrous and nonferrous metals are covered. (A9)

272-A. Simple Design Speeds Blower Wheel Assembly. *Iron Age,* v. 168, Oct. 25, 1951, p. 106-107.

How Viking Air Conditioning's simplified design and manufacturing methods have boosted output of completed assemblies to more than 500 per day. Main operations are cutting and forming, spot welding, enameling, and assembly. (A5)

273-A. Istituto Sperimentale dei Metalli Leggeri; Light Metal Research at Novara. *Metal Industry,* v. 79, Oct. 5, 1951, p. 282-284.

Facilities and research programs of Italian organization. (A9, Al, Mg)

274-A. Non-Ferrous Metals in Italy. Ian S. Menzies. *Metal Industry,* v. 79, Oct. 5, 1951, p. 300-302.

Ores, primary production, and manufacturing capacity. Includes map. (A4, B10, EG-a)

275-A. Italian Copper Industry. *Metal Industry,* v. 79, Oct. 5, 1951, p. 303.

Ore resources, refining, alloy production, and primary fabrication. (A4, B10, Cu)

276-A. Italian Aluminium Industry. Rosario Carmina. *Metal Industry,* v. 79, Oct. 5, 1951, p. 304-306.

Production and primary fabrication. Future prospects. (A4, Al)

277-A. Increased Steel Output to Supply Demands. *Mining World,* v. 13, Oct. 1951, p. 10-14.

Economic survey showing U. S. steel capacity and facilities by companies and by locations; also raw-material reserves owned by the various companies in the U. S. and abroad. (A4, ST)

278-A. Domestic Iron Mining Industry Prepares for Record Demand. *Mining World,* v. 13, Oct. 1951, p. 15-19, 90-92.

Preparations of various U. S. companies in connection with build-up of reserves and expansion of production facilities. (A4, B12, Fe)

279-A. Stainless Jet Engine Stampings Mass-Fabricated on Production Line. Gilbert C. Close. *Steel,* v. 129, Oct. 29, 1951, p. 64-65.

Formed and welded on conveyor lines, sheet-metal parts such as inner and outer combustion chambers are built to machine-shop tolerances at Solar Aircraft Co., San Diego, Calif. (A5, G1, K3, SS)

280-A. Research Team Points Efforts Toward Practical Values. A. H. Allen. *Steel,* v. 129, Oct. 29, 1951, p. 77, 85-86.

Organization and activities of Horizons, Inc., Cleveland, founded in 1947. Outlines four current projects. (A9)

281-A. Waste Problems In the Mineral Industries. James Boyd. *Chemical and Engineering News,* v. 29, Nov. 5, 1951, p. 4671-4673.

The importance of industrial wastes. Water and air pollution, recovering rare metals, losses through waste heat, and fly ash in concrete. (A8)

282-A. Scrap—Availability, Present Physical Condition, and Contamination. Ralph W. Farley and Ray J. McCurdy. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 8-14; disc., p. 14-18.

Previously abstracted from *Journal of Metals.* See item 324-A, 1950. (A8, Q5, ST)

283-A. Reclaiming Alloys From Tool Steel Mill Wastes. A. J. Schied, Jr. and W. J. Mathews. *Iron Age,* v. 168, Nov. 8, 1951, p. 125-128.

Critical alloys which are ordinarily lost in the form of mill scale, grinding chips and other process waste during toolsteel manufacture are now being recovered by an electric-furnace process. Every pound of alloy recovered adds 5 lb. of useful material available. Alloy thus salvaged could amount to 5-8% of our total toolsteel production. (A8, D5, TS)

284-A. General Outlook for Metals. Joseph Zimmerman. *Journal of the American Zinc Institute,* v. 29, 1951, p. 17-25.

Recent economic developments and future trends. (A4)

285-A. The Current World Zinc Situation. R. L. Wilcox. *Journal of the American Zinc Institute,* v. 29, 1951, p. 80-97; disc., p. 97-100.

Economic analysis. Includes tabular and graphical data. (A4, Zn)

286-A. Outlook for Die Castings in 1951. David Laine. *Journal of the American Zinc Institute,* v. 29, 1951, p. 100-105.

Economic survey and forecast. Emphasis is on Zn die castings. (A4, E13, Zn)

287-A. Brass in 1951. T. E. Veltfort. *Journal of the American Zinc Institute,* v. 29, 1951, p. 105-111.

Economic analysis and forecast, with special reference to brass-mill

production. Includes graphs covering brass-mill shipments, copper production, and durable-goods production for 1918-1951. (A4, F23, Cu)

288-A. Punched-Card Evaluation of Technical Data. (In German.) Otto Hengstenberg. *Stahl und Eisen,* v. 71, July 19, 1951, p. 776-781; disc., 781.

Possibilities of use and examples from the steel industry. Use of new types of machine-sorted cards such as the IBM. 17 ref. (A9, U8, ST)

289-A. We'll Have to Plan Now to Meet Future Zinc Needs. *Engineering and Mining Journal,* v. 152, Nov. 1951, p. 79-83.

Economic analysis indicates that increased mine and smelter capacity is needed, plus encouragement of concentrate imports. (A4, Zn)

290-A. (Book) **Design Work Sheets: Facts; Figures; Formulas.** 10th Series. 164 pages. 1950. McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

A compilation of reprints from *Product Engineering.* Individual "Reference Book Sheets" or articles on Bearings, Calculations, Constructions, Drives, Electrical Devices, Finishing, Gears, Hydraulics and Pneumatics, Materials, Mechanisms, Plastics, Springs, Steels, and Welding and Forming. (A general)

291-A. (Book) **1951 Scrap Institute Yearbook.** Ed. 12. 110 pages. 1951. Institute of Scrap Iron & Steel, Inc., 1729 H St., N.W., Washington 6, D. C. $1.00.

Annual survey of operations shows purchased scrap in 1950 reached 29,402,000 tons, a new all-time high. Data on scrap production, consumption, prices, and specifications. (A4, A8, B22, ST)

292-A. (Book) **Steel Serves the Nation. 1901-1951. The Fifty Year Story of United States Steel.** Douglas A. Fisher. 227 pages. 1951. U. S. Steel Co., 71 Broadway, New York 6, N. Y.

Accomplishments and services of the United States Steel Co. Numerous illustrations of all phases of the steel industry. Statistical data are tabulated. (A4, ST)

293-A. (Book) **Technisches Fachwörterbuch der Grundstoffindustrien.** Teil I. Englisch-Deutsch. (Technical Dictionary for the Basic Industries. Vol. I. English-German.) G. E. Lenk and Börner. 568 pages. 1951. Vandenhoeck & Ruprecht, Postfach 77, Göttingen 20b, West Germany. $10.00.

Covers 45,000 technical terms in mining, mineral beneficiation, drilling, geology, mineralogy, smelting and refining (including electrometallurgy), metalworking, physics and chemistry of metals, metal testing, machinery, construction, materials handling, and auxiliary sciences. (Vol. II, the German-English part, will be ready in 1952.) (A10)

SECTION B

RAW MATERIALS and ORE PREPARATION

1-B. Post-War Rehabilitation and Mechanization of a Philippine Chromite Mine. A. P. Davidson. *Mines Magazine,* v. 40, Dec. 1950, p. 19-24.

Includes flowsheet and description of beneficiation practice. (B14, Cr)

2-B. Bureau of Mines Studies Iron Ore Concentration—Gravity-Flotation Combination Appears Best. Ballard H. Clemmons. *Mining Engineering,* v. 187, Dec. 1950, p. 1221-1224.

Methods for concentration of poorer grade iron ores found in the Birmingham area. 20 ref. (B14, Fe)

3-B. Heavy-Media Separation Increases Brown Ore Reserves. *Mining Engineering,* v. 187, Dec. 1950, p. 1236-1237.

Equipment and procedures for mining and beneficiation of brown iron ore at the Blackburn mine of Shook & Fletcher Supply Co. about 120 miles northwest of Birmingham. (B14, B12, Fe)

4-B. The Probability Theory of Wet Ball Milling and Its Application. Elliott J. Roberts. *Mining Engineering,* v. 187, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 1267-1272.

The theory is developed that the tons ground through a given mesh per day in a wet ball mill are proportional to the per cent plus that mesh in contact with the balls and the net power applied to the balls at this point. A grindability test and typical data. (B13)

5-B. Effects of Rod Mill Feed Size Reduction. John J. Strohl and Henry J. Schwellenbach. *Mining Engineering,* v. 187, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 1273-1274.

Results obtained by decreasing the size of feed to a rod mill screen circuit. Added production was gained and a finer grind with no tonnage loss was made possible. (B13)

6-B. Laboratory Studies on Iron Ore Sintering and Testing. F. M. Hamilton and H. F. Ameen. *Mining Engineering,* v. 187, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 1275-1282.

Results of a laboratory investigation of some sintering variables. Effect on physical properties of mix-component variation and rate of cooling of the sinter is illustrated by crush and tumbler test results. Results of reducibility tests, of microscopic examination of sinters, and of using solid additions in the mix to improve bed permeability. 14 ref. (B16, Fe)

7-B. Quebec Zinc Concentrates: Mineralization—Impurities—Amenability to Electrolytic Process. B. J. Walsh. *Canadian Mining Journal,* v. 71, Dec. 1950, p. 47-54.

Magnetic fractionation was utilized to determine the proportion of sphalerite occurring as ordinary sphalerite, marmatite, or christophite in several Zn concentrates produced in the Province of Quebec. (B14, C23, Zn)

8-B. Chromium-Silicon Alloys in the Manufacture of Stainless Steels; A New Technique of Slag Reduction Developed in Sheffield. D. J. O. Brandt and W. H. Everhard. *Metal Treatment and Drop Forging,* v. 17, Autumn 1950, p. 167-170.

Use of an alloy of Fe, Si, and Cr instead of the usual 75% ferrosilicon. Comparative data for both types. (B22, D5, SS, Fe-n)

9-B. Recent Plant Results With the Lime Sintering Process. (In German.) Herbert Boos. *Stahl und Eisen,* v. 70, Nov. 23, 1950, p. 1108-1111.

Difficulties of transporting burnt lime for sintering of iron ores were successfully met by burning the limestone directly in the sintering zone. Granular limestone was mixed with iron ore and other ingredients. (B16, Fe)

10-B. Fundamental Studies on Interfacial Tensions in Flotation. I. Determination of Surface Tension With Data on Aqueous Solutions of Frothers. (In English.) Masayoshi Wada. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Aug. 1949, p. 121-131.

Determination of surface tension by the ring method and some improvements in apparatus. Existing equations for the relation between surface tension and concentration are analyzed. Data on aqueous solutions of pure surface-active agents and on commercial frothers are tabulated. 36 ref. (B14, P10)

11-B. Fundamental Studies on Dissolution of Gold in Cyanide Solutions. I. Relation between Size of Gold Particle and Time of Dissolution. (In English.) Mitsuo Kameda. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Aug. 1949, p. 133-138.

Time of dissolution calculated theoretically is compared with that obtained in cyanidation plants. (B14, Au)

12-B. Crushing in a Ball Mill (In Japanese.) M. Yoskida. *Journal of Mechanical Laboratory,* v. 4, Jan. 1950, p. 28-33.

Effects of various factors on efficiency of the process. (B13)

13-B. Studies on the Sulphuric Acid Process for Obtaining Pure Alumina From Its Ores. (In English.) K. Funaki. *Bulletin of the Tokyo Institute of Technology,* ser. B, no. 1, 1950, 165 pages.

Development of a new process in which Al silicate, natural alunite, or coal ash are heated with concentrated H_2SO_4 to dissolve the alumina. Several difficulties associated with both this step and with the separation of pure $Al_2(SO_4)_3$ have previously prevented the process from being commercialized. The author claims to have eliminated these difficulties by several modifications of the basic process. Typical results. (B14, Al)

14-B. Beneficiation of Taconites by Pyro-Metallurgy. Rudolph G. Wuerker. *Mining Engineering,* v. 190, Jan. 1951, p. 25-26.

Method and equipment for the Krupp-Renn process. Iron ore and coal, crushed to ⅜ in., are mixed and charged continuously to a revolving kiln. By passage through three temperature zones and by screening, grinding, and magnetic separation, pure nodules containing 90-97% Fe, a concentrate containing 65% Fe, and a slag containing 3% Fe are obtained. The concentrate is returned to the kiln. The nodules are charged directly to cupolas, blast furnaces, or even open-hearths. (B14, Fe)

15-B. Radiotracer Studies on the Interaction of Dithiophosphate with Galena; The Depressant Action of Phosphate. G. L. Simard, M. Burke, and D. J. Salley. *Mining Engineering,* v. 190, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1950, p. 39-44.

The depression of dithiophosphate by phosphate was investigated by correlating radiotagging measurements of competition in sorption with measurements of flotation. Competition in sorption was as complex as the sorption of the individual ions, thus strengthening the conclusion that more than one process is involved in the interaction of the ions with galena. (B14, S19, Pb)

16-B. Flotation Tests on Korean Scheelite Ore. Will Mitchell, C. L. Sollenberger, and T. G. Kirkland. *Mining Engineering,* v. 190, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1950, p. 60-64.

Beneficiation of a scheelite ore by flotation was investigated with emphasis on determining optimum conditions for obtaining maximum grade and recovery in the rougher concentrates. Variables such as pH, time, temperature, and pulp density during conditioning were plotted against grade and recovery of the rougher concentrates. Several gangue regulators, and several methods of cleaning rougher concentrates. 10 ref. (B14, W)

17-B. Experiments on Forsterite Linings Reported Successful. B. M. Pearson. *Iron Age,* v. 167, Jan. 18, 1951, p. 65-67.

According to recent German literature, good results have been achieved with Forsterite linings in induction furnaces. The raw material, Norwegian olivines, is plentiful, hence this practice may find wider use. (B19)

18-B. Steel Mill Fuels. O. P. Adams. *Industrial Heating,* v. 17, Dec. 1950, p. 2152, 2154, 2156, 2158, 2242.

Constituents and properties as well as problems encountered in use of the various fuels utilized by steel plants. (B18, ST)

19-B. An Accurate Density Meter —How It Works, How It Is Used. C. M. Marquardt. *Engineering and Mining Journal,* v. 152, Jan. 1951, p. 78-82.

Automatic, continuous, pulp-density meter developed for controlling density of solid-liquid suspensions in ore-beneficiation plants. (B14)

20-B. Simple Flowsheet, High-Capacity Units Make for Low-Cost Lead-Zinc Output in New Reeves-MacDonald Mill. John B. Huttl. *Engineering and Mining Journal,* v. 152, Jan. 1951, p. 84-85.

The mill of Pend-Oreille Mines & Metals Co., in British Columbia. (B13, B14, Pb, Zn)

21-B. Trout Rebuilds Manganese Mill. *Mining World,* v. 13, Jan. 1951, p. 33-35, 59.

Wet-milling plant for MnO_2 ore, which was rebuilt following a fire. Capacity was increased to 75 tons per day. It is located at Philipsburg, Montana, and is owned by Trout Mining Div., American Machine & Metals, Inc. (B13, Mn)

22-B. Size Reduction. Lincoln T. Work. *Industrial and Engineering Chemistry,* v. 43, Jan. 1951, p. 114-116.

Reviews literature of past year. 68 ref. (B13)

23-B. (Book) **Iron Blast-Furnace Slag Production, Processing, Properties, and Uses.** G. W. Josephson, F. Sillers, Jr., and D. G. Runner. 304 pages. 1949. U. S. Bureau of Mines, Superintendent of Documents, Washington 25, D. C. (Bulletin 479).

History and development. Includes sections on chemical and mineralogical composition, use as aggregate for portland-cement concrete and for flexible-pavement bases and surfaces, chemical and ceramic uses, railroad ballast, roofing, and other uses. 554 ref. (B21, D1, T general)

24-B. Subject: Substitutions. Ernest E. Thum. *Metal Progress,* v. 59, Jan. 1951, p. 51-53.

What can be done by way of alloying-element and metal substitution during the present and coming emergency. Reviews what was done during World War II, and practical prospects for further improvements along these lines. (B10, A4)

25-B. Zirconia Refractory Good to 4600° F. *Steel,* v. 128, Jan. 29, 1951, p. 68.

Properties and applications of new product of Norton Co., Worcester, Mass. (B19)

26-B. Melting of Silicide Compounds. (In Russian.) P. V. Geld and N. N. Buinov. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Oct. 1950, p. 1087-1094.

On the basis of chemical, crystallographic, and electron-microscope investigation of the sublimation product from furnaces for melting ferrosilicon, it is shown that losses of Si are related to intermediate formation of silicon monoxide. Origin and composition of smoke deposits and scale formed by these furnaces were investigated. 14 ref. (B22, Fe-n)

27-B. Interfacial Tension of Iron Alloys at the Slag-Metal Boundary. (In Russian.) S. I. Popel, O. A. Esin, and P. V. Geld. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Nov. 11, 1950, p. 227-230.

Results of experimental investigation on cast iron containing 3.45% C, 2.21% Si, 0.64% Mn, 0.263% P, and 0.105% S. Eight different slags were used. (B21, D general, CI)

28-B. Phase Equilibrium Relationships in a Portion of the System MgO-Al_2O_3-$2CaO \cdot SiO_2$. A. T. Prince. *Journal of the American Ceramic Society,* v. 34, Feb. 1951, p. 44-51.

108 compositions were prepared having an Al_2O_3 content below the line joining $2CaO \cdot Al_2O_3$ and $MgO \cdot Al_2O_3$. Quenching experiments were carried out on 96 of these compositions at temperatures up to 1590° C. Three binary and two ternary eutectic systems are described. These compositions are of significance with respect to basic refractory clinkers made from Canadian dolomitic magnesites and to certain blast-furnace slags. 11 ref. (B21, D1, ST)

29-B. The Behavior of Solutions of Titanium Dioxide in Sulfuric Acid in the Presence of Metallic Sulfates. Recovery of Titania From the Bauxite Sludge. The Behavior of Solutions of Titanium Dioxide in Sulfuric Acid in the Presence of Certain Bivalent Metallic Sulfates. S. M. Mehta and R. P. Poncha. *Journal of the American Chemical Society,* v. 73, Jan. 1951, p. 224-228.

Three companion papers present results of experiments in titanium chemistry which may be of value in recovery of the dioxide for various uses or for reduction to metallic Ti. 10 ref. (B14, Ti)

30-B. Operating Factors In Heavy-Media Processing. Part I. Development of New Equipment Paces Advance in Separation Methods. L. J. Erck. *Mining Congress Journal,* v. 37, Jan. 1951, p. 18-20, 43.

(B14)

31-B. Blast Furnace Sintering Practice Surveyed. Robert E. Powers. *Steel,*

v. 128, Feb. 5, 1951, p. 95, 97, 99, 102, 104, 107-108.

Recommendations for improvement. (B16, Fe)

32-B. Sintering Practice at Josephtown Smelter. H. K. Najarian, Karl F. Peterson, and Robert E. Lund. *Journal of Metals*, v. 191, Feb. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 116-119.

Primary products are Zn metal of various grades, Pb-free ZnO pigments, Cd metal, and H_2SO_4. Zn concentrates of domestic and foreign origin are blended and desulfurized at the roaster plant. Sinter circuits are shown diagrammatically. Dust and fume recovery.
(B16, C21, Zn, Cd)

33-B. Reverse Leaching of Zinc Calcine. L. P. Davidson, R. K. Carpenter, and H. J. Tschirner. *Journal of Metals*, v. 191, Feb. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 134-136.

The electrolytic Zn plant of American Zinc Co. of Illinois was expanded to a capacity of 100 tons of slab Zn daily, but leaching plant was unable to deliver an adequate amount of solution for electrolysis. The leaching method was changed so that acid was added to the roasted Zn. Conditions which prevented satisfactory results before the change and difficulties which arose in reversing the usual leaching procedure. (B14, C23, Zn)

34-B. Some Trends in Iron and Steel Works' Refractories. G. Reginald Bashforth. *Refractories Journal*, Dec. 1950, p. 512-527; disc., p. 528-533.

19 ref. (B19)

35-B. The Treatment of Gold Ores in South Africa and Canada. *Bulletin of the Institution of Mining and Metallurgy*, Jan. 1951; *Transactions*, v. 60, pt. 4, 1950-51, p. 133-141.

Discussion of paper by E. C. Ellwood. (Nov. 1950 issue; see item 334-B, 1950.) (B13, Au)

36-B. Low-Manganese Hessian Limonites and Preparation of Lahn-Dill Ores. (In German.) Joachim Dietrich. *Stahl und Eisen*, v. 70, Dec. 21, 1950, p. 1205-1208.

Methods for beneficiation of Hessian basaltic limonite, Vogelsberg bauxite, and Mardorf "bean" ore. Operations at the Excelsior ore-washing plant, also principles of preparation of red hematite from the Lahn-Dill district and its effect in the blast furnace. (B14, Fe)

37-B. Wet Extraction of Zinc From a Mixture of Sulfides. (In Russian.) I. N. Kuz'minykh and E. L. Yakhontova. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Nov. 1950, p. 1142-1148.

The action of acidic aqueous solutions of $Fe_2(SO_4)_3$ on a mixture of sulfides containing an appreciable amount of Zn, Pb, and Mn was studied. It was found that Mn and Zn can be completely dissolved by a solution of $Fe_2(SO_4)_3$. (B14, Zn)

38-B. Silicon Monoxide in Slags During Production of Ferro Alloys. (In Russian.) P. V. Gel'd and O. A. Esin. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Nov. 1950, p. 1200-1207.

Results of chemical analysis, and of crystallographic and X-ray investigation, showing that slags produced under strongly reducing conditions may be considered as systems containing large amounts of SiO, as well as silicates. Slag samples formed from two immiscible liquid phases, one very rich in SiO, are explained. Effect of presence of SiO in the $CaO-Al_2O_3-SiO_2$ system. 15 ref. (B22, Fe-n)

39-B. Fundamental Studies on Dissolution of Gold in Cyanide Solutions. II. On Equations of Reactions and Effects of Cyanide Strength and Other Variables on Dissolution Rate. (In English.) Mitsuo Kameda. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 1, Oct. 1949, p. 223-230; Dec. 1949, p. 435-444.

Results of experimental investigation and theoretical analysis. 20 ref. (B14, Au)

40-B. Fundamental Studies on Interfacial Tensions in Flotation. II. Surface-Tension Variation, Surface Activity, and Surface Orientation of Frothers at Air-Water Interface. (In English.) Masayoshi Wada. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 1, Dec. 1949, p. 425-434.

It was found that surface tension of cineol solutions varies appreciably during measurement by a tensiometer. Time variation of surface tension of aqueous solutions of frothers was theoretically analyzed. Activity coefficients of pure and commercial frothers were calculated. An equation for relation between surface pressure and surface concentration of various frothers. Relation between surface pressure and area occupied by a gram molecule is expressed by a formula.
(B14, P10, P12)

41-B. Sintering and Preparation of Iron Ores at the Plant of "Altos Hornos de Viscaya, S. A." (In Spanish.) F. Millan and F. Barbadillo. *Instituto del Hierro y del Acero*, v. 3, Jan.-Mar.

1950, p. 47-53.

A proposed plant to sinter mixtures of Spanish iron ores, with total capacity of 2000 tons per day. Two Dwight-Lloyd machines will be used. (B16, Fe)

42-B. Errors in Grading Analyses. L. Ackermann. *Mining Magazine,* v. 84, Jan. 1951, p. 9-20.

An investigation of incidence, magnitude, and causes of normally occurring errors in routine screen analyses and of experiments conducted to determine the most suitable method of conducting such analyses on sand and slime produced from conglomerates and quartzites of the Witwatersrand Banket Series in South Africa. 10 ref. (B13)

43-B. The Vanadium Minerals. Part II. Mineral Sources of Vanadium. F. F. Franklin. *Vancoram Review,* v. 6, No. 4, 1950, p. 10-11.

(B10, V)

44-B. Substitutes for Pig Iron. G. S. Baldwin. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 91-92; disc., p. 95.

Natural-gas-coke charging practice. Results as compared to other carburizing materials. (B22, D2, ST)

45-B. Use of Graphite in the Cold-Metal Charge. Clyde B. Jenni. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 93-95; disc., p. 95.

Practice at General Steel Casting Corp., Eddystone, Pa. (B22, D2, ST)

46-B. Substitutes for Pig Iron—Economics and Effect on Production. R. C. Solomon. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 96-98; disc., p. 98-100.

(B22, D2, ST)

47-B. Quality of Raw Materials. Gordon McMillin and John R. Patton. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 103-106; disc., p. 106-107.

Use of limestone, burnt lime, fluorspar, and pig-iron substitutes, based on data obtained from 59 cold-metal nonintegrated basic open-hearth furnace plants in the U. S. and Canada. (B22, D2, ST)

48-B. Australia's Copper Industry. L. A. Lyons. *Mine & Quarry Engineering,* v. 17, Feb. 1951, p. 41-47.

Reserves, mining, beneficiation, and smelting. (B10, B12, B14, C21, Cu)

49-B. Action of Titanium Tetrachloride on Ilmenite. (In French.) Claude Pascaud. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Nov. 27, 1950, p. 1232-1233.

Treatment with $TiCl_4$ at 850° C. under 30 mm. Hg eliminates oxides of Fe and other metals except silica and alumina. Application of the principle to a method for separation of Fe and Ti from ilmenite-type ores. (B14, Fe, Ti)

50-B. Revived Processes Challenge Flotation's Thirty-Year Rule. R. H. Ramsey. *Engineering and Mining Journal,* v. 152, Feb. 1951, p. 116-118.

Recent developments in ore preparation and beneficiation, including revival of interest in such processes as leaching. (B14)

51-B. Huge Expansion in Prospect for Iron Ore Beneficiation. L. A. Roe. *Engineering and Mining Journal,* v. 152, Feb. 1951, p. 119-121.

New technical developments and commercial plants. (B14, Fe)

52-B. The Extraction of Uranium. *Chemical Age,* v. 64, Feb. 3, 1951, p. 214-215. (Condensed from paper by F. W. McQuiston, Jr., *South African Mining and Engineering Journal,* v. 61, pt. 2, No. 3021.)

(B14, U)

53-B. Crushing Practice and Theory. Brownell McGrew. *Rock Products,* v. 54, Feb. 1951, p. 106-107, 122-123.

High and low-speed products; effects on reduction ratio; kind of feed; effect of feed gradation; and choke-feed vs. regulated feed. (B13)

54-B. Annual Review: Beneficiation in 1950. Grover J. Holt. *Mining Engineering,* v. 190, Feb. 1951, p. 122-125.

New developments. (B14)

55-B. Pure Oxide Refractories. D. Kirby. *Refractories Journal,* v. 27, Jan. 1951, p. 11-14.

Formulation and applications. (B19)

56-B. Krupp-Renn Tests on French Minette Ore. P. E. Henry, C. F. Ramseyer, and J. R. Miller. *Iron and Steel Engineer,* v. 28, Feb. 1951, p. 66-78.

Details of the process, including equipment diagrams. It was developed in Germany in the early 1930's. Claims that it has possibilities for ore beneficiation which may make it fit in with conventional iron-making procedures. A cost analysis of possibilities of adaptation to American conditions. (B13, Fe)

57-B. There's Big Ceramic Potential in the New, Unusual Silicon Carbide. *Brick & Clay Record,* v. 118, Mar. 1951,

p. 62-63.

Refractory composed of a network of SiC embedded in Si metal which possesses a unique combination of properties which make it highly suitable for ceramic-plant use in muffles, kiln furniture, and heating elements. (B19, T5, Si, C-n)

58-B. Rare Earth, Inc., Redredges Idaho Gold Placer for Monazite. Walter Hovey Hill. *Mining World,* v. 13, Feb. 1951, p. 12-14.

Includes concentration flowsheet. (B12, B13, Th)

59-B. Ima Tungsten—Pre - Korean Development Proves Boon to Preparedness Drive. *Mining World,* v. 13, Mar. 1951, p. 10-13, 81.

Mining and beneficiation procedures at Ima mine and mill of Bradley Mining Co., in Idaho. Includes flowsheet. (B12, B14, W)

60-B. Use of Magnetic Ores From New York State. K. G. LeViseur. *Blast Furnace and Steel Plant,* v. 39, Feb. 1951, p. 200-202, 222.

Economic and technological factors on the basis of experiences of Republic Steel Corp. Includes beneficiation, sintering, and use in the blast furnace and openhearth. (B14, B16, D1, Fe)

61-B. New Mill Treats Gold Ores of Colorado's Cripple Creek District. *Skilling's Mining Review,* v. 39, Mar. 10, 1951, p. 1.

Briefly described. (B13, B14, Au)

62-B. Advances in Mineral Dressing. Strathmore R. B. Cooke. *Mining Congress Journal,* v. 37, Feb. 1951, p. 47-49.

Annual review. (B14)

63-B. AEC Raw Materials Program. *Mining Congress Journal,* v. 37, Feb. 1951, p. 86-89.

Trends and general status of the domestic raw-materials program for atomic energy. Areas and types of deposits on which major domestic exploration efforts have been expended. A few of the new developments. (B10, U)

64-B. An Appraisal of the Iron-Ore Resources of the World. John W. Gruner. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 4-15, disc. p. 15-17.

Regions of the U. S. and countries of the different continents. 18 ref. (B10, Fe)

65-B. Fundamental Factors Influencing the Strength of Green and Burned Pellets Made From Fine Magnetite-Ore Concentrates. M. Tigerschiold and P. A. Ilmoni. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 18-45; disc. p. 46-53.

Experimental procedure, apparatus, and iron-ore concentrates used. 10 ref. (B16, Fe)

66-B. Pelletizing of Iron-Bearing Fines by Extrusion. P. E. Cavanagh. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 54-72; disc. p. 72-80.

A vacuum-extrusion machine which provides a simple and cheap method of pelletizing all types of ores, both swelling and nonswelling. Pellets can be charged in the air-dried state, without burning. Development of techniques for plasticizing and binding sandy types of ores. (B16, Fe)

67-B. Present Method of Grading and Grouping Iron Ores. N. H. Thomas. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 187-193; disc. p. 193-194.

Methods of sampling and materials handling. (B11, Fe)

68-B. Beneficiation of Adirondack Magnetite. W. R. Webb and R. G. Fleck. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 220-230; disc. p. 230-236.

Previously abstracted from *Mining Engineering.* See item 192-B, 1950. (B16, Fe)

69-B. Operating Practices at the Portsmouth Sinter Plant. Guy B. Hunner. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 236-241; disc. p. 241-245.

Previously abstracted from *Journal of Metals.* See item 99-B, 1950. (B16, Fe)

70-B. Swedish Sintering Practice—The Holmberg System. A. W. Robinson. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 246-258; disc. p. 258-267. (B16, Fe)

71-B. Flotation. H. R. Spedden. "Encyclopedia of Chemical Technology," *Interscience Encyclopedia* (New York),

1951, p. 595-614.
A general discussion. 22 ref. (B13)

72-B. Non-Ferrous Metals; Extraction and Refining (Excluding Electro-Metallurgy). S. W. Smith. *Reports on the Progress of Applied Chemistry,* v. 34, 1949, p. 138-151.
Reviews methods by metal. 93 ref. (B general, C general, EG-a)

73-B. Concentrating Operations of the Yunnan Consolidated Tin Corp., Kochiu, Yunnan, China. T. T. Ni and Shiou-Chuan Sun. *Canadian Mining and Metallurgical Bulletin,* v. 44, Feb. 1951, p. 74-77; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, p. 40-43.
Mining and smelting, mineralogy, mill flowsheet, desliming, tabling, and cleaning of table concentrate. (B14, Sn)

74-B. Madsen Milling Practice. L. H. Van Loon. *Canadian Mining and Metallurgical Bulletin,* v. 44, Feb. 1951, p. 105-113.
Crushing, conveying, grinding, thickening, cyanidation, classification, tabling, amalgamation, etc., at Madsen Red Lake Gold Mines, Ltd. (B13, Au)

75-B. Chromium-Silicon Alloys in the Manufacture of Stainless Steels; A New Technique of Slag Reduction Developed in Sheffield. D. J. O. Brandt and W. H. Everard. *Edgar Allen News,* v. 29, Feb. 1951, p. 781-784.
Previously abstracted from *Metal Treatment and Drop Forging.* See item 8-B, 1951. (B22, D5, SS, Fe-n)

76-B. The Smidth Agglomerating Kiln; Plant and Practice at East Moors Works, Cardiff. W. E. Simons. *Journal of the Iron and Steel Institute,* v. 167, Jan. 1951, p. 1-8.
The rotary kiln provides an alternative method to sintering for the treatment of fine iron ores and flue dust. Construction of a particular rotary kiln and layout of the plant. Operating procedure. Analyses of the raw materials and of finished agglomerate. Use of the agglomerate in the blast furnace. Advantages and disadvantages of the rotary kiln. (B16, Fe)

77-B. Action of Gases and Reagents on Minerals During Flotation. (In Russian.) I. N. Plaksin. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Dec. 1950, p. 1827-1843.
Influence of contact angle and bubble dimensions on force of adhesion of particles to it; changes of contact angle with time; influence of gas sorption on the surface of particles and chemical reactions of gases, especially oxygen, with the minerals; conditions of bubble formation at the liquid-solid interface; influence of reagents on contact angle and speed of adhesion; and mechanism of mineralization of bubbles in the pulp and in the froth. 29 ref. (B14)

78-B. Thermodynamics and Slag Structure. (In Polish.) Julian Kamecki. *Hutnik,* v. 17, July-Aug. 1950, p. 190-195.
Thermodynamics of slag formation during smelting of iron ore and during refining of steel on the basis of the literature and the author's investigation. Crystal structure of the slag is analyzed. 16 ref. (B21, D general, P12, ST)

79-B. Control of Basicity of Open-hearth Slags on the Basis of Appearance of Solidified Samples. (In Polish.) Jerzy Zieba. *Hutnik,* v. 17, July-Aug. 1950, p. 196-204.
Control method, especially the sampling technique. Seven different types of slag having $CaO\text{-}SiO_2$ ratios varying from 1.25 to 4.40 were investigated. Fe contents ranged from 7.06 to 15.08%. Influence of composition on appearance and properties of solidified slags. Results indicate possibility of control of basicity by visual inspection of solidified samples. (B21, D2, ST)

80-B. Krupp-Renn Process Urged for Iron Ore Beneficiation. P. E. Henry, C. F. Ramseyer, and J. R. Miller. *Steel,* v. 128, Mar. 12, 1951, p. 92, 95, 98.
Nonmagnetic taconites can be beneficiated directly without magnetic roasting in rotary-kiln plant which raises the grade of iron from 28 to approximately 92-93%. Product is being successfully used in European blast furnaces. (B14, D1, Fe)

81-B. Universal Type Electrostatic Separator. Foster Fraas and Oliver C. Ralston. *U. S. Bureau of Mines,* Report of Investigations 4766, Feb. 1951, 4 pages.
Separator is provided with a dielectric electrode and permits formation of high-intensity static fields. Application to crushed ores, sands, and industrial products. (B14).

82-B. The Operation of Ball Mills. Douglas R. Channell. *Industrial Chemist and Chemical Manufacturer,* v. 27, Feb. 1951, p. 69-73.
Factors affecting the operation of ball mills together with graphs indicating suitable working conditions. (B13)

83-B. Gas and Coke in Aluminium Manufacture. *Coke and Gas,* v. 13, Feb. 1951, p. 68-72.
Use of coke-oven gas in the manufacture of Al at a British plant. (B18, Al)

84-B. (Book) **Elements of Ore Dressing.** Arthur F. Taggart. 595 pages. 1951. John Wiley and Sons, Inc., 440 Fourth Ave., New York 16. $10.

Ore-dressing facts, empirical generalizations most used, tested theories in design and control of operations, laboratory instructions, and recent advances in fine crushing, grinding, dewatering, and sink-float concentrations. Review questions and a bibliography follow each chapter. (B13, B14)

85-B. (Book) **Cyanidation and Concentration of Gold and Silver Ores. Ed. 2.** John V. N. Dorr and Francis L. Bosqui. 509 pages. 1950. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18. $8.50.

Divided into two principal sections. Part I: unit processes employed in the cyanidation and concentration of ores together with the technical principles involved and equipment used in general practice. Special methods for the treatment of refractory ores, and the recovery of bullion from amalgamation and from cyanide solutions. Part II: plant descriptions and flowsheets, cost data and other metallurgical information reported from gold and silver mills throughout the world. (B general, Au)

86-B. A New Surface Measurement Tool for Mineral Engineers. F. W. Bloecher, Jr. *Mining Engineering,* v. 3, Mar. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 255-258.

Method and apparatus for determination of the surface area of finely divided minerals. It involves low-temperature krypton adsorption measurements and the technique described by Beebe. 18 ref. (B general, S15)

87-B. Fused Stabilized Zirconia. Part III. Properties and Uses of Stabilized Zirconia Products. Osgood J. Whittemore. *Industrial Heating,* v. 18, Mar. 1951, p. 512, 514, 516.

An illustrated survey. (B19)

88-B. A Review of World Coal and Iron Ore Resources and Their Utilization for Manufacture of Steel. Part II. W. C. Rueckel. *Blast Furnace and Steel Plant,* v. 39, Mar. 1951, p. 327-332.

Continues survey and includes information on Russian capacity and production. (B10, A4, Fe, ST)

89-B. Brazilian Iron Ore Resources. R. G. Walker. *Blast Furnace and Steel Plant,* v. 39, Mar. 1951, p. 337-338.

Brief review. (B10, Fe)

90-B. The World's Largest Sintering Plant. W. J. Urban. *Blast Furnace and Steel Plant,* v. 39, Mar. 1951, p. 339-342.

Machine having a hearth width of 12 ft., and an active length of 168 ft., developed by American Ore Reclamation Co. and Blackwell Zinc Co. for sintering of Zn ore, but equally applicable to the sintering of Fe ores. (B16, Zn, Fe)

91-B. More Manganese From American Ores and Slags. E. C. Wright. *Metal Progress,* v. 59, Mar. 1951, p. 347-353.

Method for concentration of Mn from low-Mn materials, such as low-grade domestic Mn-ores and steel-mill slags, consisting of smelting the Mn-bearing materials in a blast furnace to produce a high-Mn pig iron, then partially oxidizing the pig iron in a converter to obtain a Mn-rich slag. Small laboratory heats indicated that slags containing 40-50% MnO can readily be produced by blowing 3-4% Mn pig iron down to about 0.8% Mn. Such slags had MnO-FeO ratios greater than 4 to 1, and hence, can be utilized in the production of manganese ferroalloys. An important part of the Mn requirements of the steel industry can be met by using native, low-grade manganese ores and recycling the steel-plant slags. (B21, Mn, ST)

92-B. L. S. Iron Ore Mines' 1950 Shipments Totaled 82,186,545 Gross Tons. *Skillings' Mining Review,* v. 39, Mar. 24, 1951, p. 1-2.

Tabulation of Lake Superior shipments by range and by mine, including separate table for beneficiated ores. (B10, A4, Fe)

93-B. New Zirconia Refractory Material Useful at Temperatures to 4600 F. *Materials & Methods,* v. 33, Mar. 1951, p. 81.

Properties and applications. (B19)

94-B. Sintering Nonferrous Metals. A. A. Nilsen and W. J. Urban. *Journal of Metals,* v. 3, Apr. 1951, p. 311-312.

Equipment made by American Ore Reclamation Co. (B16, EG-a)

95-B. Taconite: Iron Ore Bonanza. Morton M. Hunt. *Steelways,* v. 7, Mar. 1951, p. 1-5.

Popularized story of the development of commercially feasible taconite beneficiation process. (B14, Fe)

96-B. Studies in Cassiterite Flotation. E. J. Pryor and S. A. Wrobel. *Bulletin of the Institution of Mining and Metallurgy,* Mar. 1951; *Transactions,* v. 60, pt. 6, 1950-51, p. 201-237.

Classifies cassiterite-bearing minerals into three groups, and defines their properties. Conditions for the activation and froth flotation of tin with xanthate collectors; experimental verification. Laboratory flotation of cassiterite from Cornwall, to-

gether with the conditioning treatment needed to activate the mineral surface. 12 ref. (B14, Sn)

97-B. Minor Uses of the Light Metals. III. Titanium as a Deoxidizer. *Light Metals,* v. 14, Mar. 1951, p. 153-154.

As applied to deoxidation of steel and cast iron. (B22, Ti, ST, CI)

98-B. FluoSolids Roasting of Sulphides. T. B. Counselman. *Mining Congress Journal,* v. 37, Mar. 1951, p. 30-34, 53.

See abstract of "FluoSolids for Roasting", *Engineering and Mining Journal,* item 103-B, 1950. (B15)

99-B. Utah's New Uranium Mill. John A. Butler. *Engineering and Mining Journal,* v. 152, Mar. 1951, p. 56-62.

How a continuous leaching technique is increasing uranium production at Galigher Co., Monticello, Utah. Vanadium is also recovered. Includes flow diagrams. (B14, U, V)

100-B. Concentration of Oxide and Silicate Manganese Ores From the Vicinity of Golconda, Nev. B. K. Shibler and R. R. Wells. *U. S. Bureau of Mines,* Report of Investigation 4754, Jan. 1951, 16 pages.

Tests made to determine the amenability of ores from five manganese properties near Golconda, Nev. (B14, Mn)

101-B. Simple Treatment Methods for Oxide Gold and Silver Ores. A. L. Engel. *U. S. Bureau of Mines,* Report of Investigation 4758, Jan. 1951, 14 pages.

Preliminary tests made to assist in the economical exploitation of low-grade and marginal ores. Methods of treatment used include gravity concentration, amalgamation, flotation, and cyanidation. (B14, Ag, Au)

102-B. Experimental Treatment of Oxidized Lead-Silver Ore From Eureka, Nev. A. L. Engel. *U. S. Bureau of Mines,* Report of Investigations 4762, Jan. 1951, 9 pages.

Gravity concentration, flotation, and cyanidation tests on low-grade ores. (B14, Ag, Pb)

103-B. Concentration of Carbonate and Oxide Manganese Ores From Silver Bow, Jefferson and Park Counties, Mont. K. C. Dean and J. V. Batty. *U. S. Bureau of Mines.* Report of Investigations 4767, Mar. 1951, 22 pages.

Laboratory tests to determine the amenability of Tzarena claim, Minnie Jane mine, McClellan-Eackley lease, and Irma mine ores to standard ore-dressing methods. (B14, Mn)

104-B. Use of Magnetic Ores From New York State. K. G. LeViseur. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 29-37.

Previously abstracted from *Blast Furnace and Steel Plant.* See item 60-B, 1951. (B14, B16, D1, Fe)

105-B. A Survey of Blast Furnace Sintering Practice. Robert E. Powers. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 185-216.

Previously abstracted from *Steel.* See item 31-B, 1951. (B16, Fe)

106-B. The Role of Alumina in Slags. F. E. Lathe. *Canadian Mining and Metallurgical Bulletin,* v. 44, Mar. 1951, p. 165-173; disc. p. 173-174; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 95-103; disc. p. 103-104.

Study, based largely upon phase diagrams and other theoretical considerations, but nevertheless addressed primarily to the practical metallurgist. Melting points in simple and complex oxide systems, Fe silicate slags, Ca silicate slags, and complex slags. 36 ref. (B21)

107-B. Magnetic Fractionation of Sphalerite in Zinc Concentrates. B. J. Walsh. *Canadian Mining and Metallurgical Bulletin,* v. 44, Mar. 1951, p. 175-180; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 105-110.

A Frantz ferromagnetic filter, 1.2 amp., and a Dings magnet, 0.3 amp., were used to fractionate seven Zn concentrates produced in the Province of Quebec. Results indicate that the magnetic susceptibility of sphalerite increases with increasing isomorphous iron content and that a satisfactory separation into christophite, marmatite, and ordinary sphalerite can be accomplished by magnetic fractionation. (B14, Zn)

108-B. Oil Firing of Non-Ferrous Metallurgical Furnace. M. Roddan. *Metal Treatment and Drop Forging,* v. 18, Mar. 1951, p. 111-117; disc. p. 117-118.

Types of fuel oil and their important features, as well as some of the various oil-fired furnaces available to the nonferrous industry for refining, melting and heating. (B18, C21, E10, EG-a)

109-B. A Review of Recent Work Done on the Sintering of Iron Ores. J. M. McLeod. *Journal of the Royal Technical College,* v. 5, Jan. 1950, p. 199-206.

Summarizes three papers (1942, 1944, and 1946) by the author and by R. Hay. (B16, Fe)

110-B. Measurement of the Surface Tension of Molten Silicates. T. B. King. *Journal of the Royal Technical*

College, v. 5, Jan. 1950, p. 217-225.

Surface tension of molten slags is a guide to their constitution and to their foaming tendencies. An apparatus suitable for measurement of this property at temperatures up to 1600° C. It is an adaptation of the ring method, utilizing a sphere instead of a ring. Results for the manganese silicate, rhodonite, show that surface tension reaches a maximum at about 1525° C. This is tentatively explained in terms of changes in constitution of the liquid. Some relation exists between surface tension and foaming properties. Particulars of a modified apparatus using a platinum cylinder and capable of greater accuracy than the sphere method. (B21, P10)

111-B. Investigation of Flotation Tailings for Emperor Gold Mining Co., Ltd., Vatukoula, Fiji. Evan E. Hughes and C. Meharry. *Commonwealth Scientific and Industrial Organization and the Kalgoorlie School of Mines* (Joint Investigation), Ore-Dressing Investigation Report 403, May 1950, 5 pages.

(B14, Au)

112-B. Tests to Determine a Method of Treatment of Ore From the Sterling Gold Mine, Marble Bar, W. A. Final Report. Evan E. Hughes and C. Meharry. *Commonwealth Scientific and Industrial Organization and the Kalgoorlie School of Mines* (Joint Investigation). Ore-Dressing Investigation Report 437, July 1950, 6 pages.

Results for various beneficiation processes. (B14, Au)

113-B. Separation of Nickel and Copper in Nickel-Copper Matte. (In German.) Helmut Schlecht and Leo Schlecht. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Jan. 1951, p. 1-3.

Different methods and a new process in which the matte is heated, crushed, and then subjected to a mechanical separation process, or to flotation. (B18, B14, Ni, Cu)

114-B. Plant Experiences With a Sedimentation-Flotation Process for Separating Lead-Zinc Ore From the Willibald Mine in Ramsbeck. (In German.) Günther Salzmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Jan. 1951, p. 7-14.

Details of the process. Includes flow diagrams of a 50-ton-per-hr. plant, also design, operating, and economic data. (B14, Pb, Zn)

115-B. Pulverized-Coal Firing in Furnaces Used in the Iron and Steel Industry. (In German.) Karl Kessels. *Stahl und Eisen,* v. 71, Jan. 18, 1951, p. 53-63; disc. p. 63-64.

Type of fuel; its preparation, grinding, storing, and conveying; design of pulverized-coal nozzles and furnaces; calorific value; and economics. (B18, Fe, ST)

116-B. Economic and Metallurgical Advantages of Chrome-Magnesite Over Silica Furnaces Refractories. (In German.) Peter Bremer. *Stahl und Eisen,* v. 71, Jan. 18, 1951, p. 64-69; disc. p. 69-71.

Cost analysis and data. (B19)

117-B. Preparation and Tests of Refractory Sulfide Crucibles. E. D. Eastman, Leo Brewer, LeRoy A. Bromley, Paul W. Gilles, and Norman L. Lofgren. *Journal of the American Ceramic Society,* v. 34, Apr. 1951, p. 128-134.

Crucibles were prepared from all of the sulfides of Ba, Ce, and Th, and also from some of the mixed sulfides of Ce with Th and U with Th. Type of molds used, as well as methods of pressing the sulfide powders. Sintering procedures and techniques for each of the various refractories. Tests of some of the crucibles indicate that they are satisfactory refractories for a large number of metals and halides. (B19)

118-B. Grinding Mills as Conditioners in Sulphide Flotation. C. G. McLachlan. *Mining Engineering,* v. 3, Apr. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 347-350.

Laboratory flotation tests carried out on massive sulfide ores may not be reproducible in plant practice. When this occurs the discrepancy may be caused by differences between laboratory and plant grinding. Results of parallel flotation tests support this contention, and data show how tailing losses are affected in corresponding size zones. Data on a Cu-sulfide ore from Noranda Mines in Quebec are tabulated. (B13, B14, Cu)

119-B. Sinter Making at Appleby-Frodingham. G. D. Elliot and N. D. Macdonald. *Journal of the Iron and Steel Institute,* v. 167, Mar. 1951, p. 261-272.

Large-scale research conducted to improve the quality of sinter manufactured from Frodingham and Northampton iron-ore fines. Several aspects of plant, raw materials, and practice. 12 ref. (B16, Fe)

120-B. (Book) Refractory Materials; Their Manufacture and Use. Ed. 3. Alfred B. Searle. 895 pages. 1950. Mapleton House, 5415 17th Ave., Brooklyn 4, N. Y. $9.00.

A reprint of the 1940 edition. (B19)

121-B. (Book) **Refractories Bibliography—1928-1947, Inclusive.** 1088 pages. 1950. American Ceramic Society, Columbus, Ohio.

Lists 13,300 items with abstracts covering U. S. and foreign periodical literature and patents. The initial list of references and abstracts was prepared at Battelle. Arrangement is alphabetically by author. Includes subject index. (B19)

122-B. (Pamphlet) **World Iron Ore Resources and Their Utilization.** 1950. 74 pages. United Nations, Department of Economic Affairs, Lake Success, N. Y.

Economic feasibility of developing iron and steel production in the under-developed areas of the world. (B10, Fe)

123-B. (Book) **Annotated Bibliography of Economic Geology.** Vol. XVII, 1944. Robert B. Miller, editor. 423 pages. Sept. 1950. Economic Geology Publishing Co., Urbana, Ill.

Includes section on metallic-ore resources with 308 references. (B10)

124-B. (Book) **Die Eisenerzvorrate der Welt** (Iron Ore Resources of the World). G. Einicke. 418 pages. Verlag Stahleisen, Dusseldorf, Germany. 66 DM.

The latest available information on iron-ore deposits is compiled continent by continent, country by country. Effects of geological formations, iron content of ore, accessibility, cost of transportation, political and economic considerations. Ore beds of importance to the German iron and steel industry are emphasized. (B10, A4, Fe)

125-B. Sintered Oxide Crucibles Withstand Temperatures Exceeding 2000° Centigrade. *Brick & Clay Record,* v. 118, Apr. 1951, p. 72-73.

Non-porous pure metallic oxides that are chemically and physically stable at high temperatures, and are useful as super-refractories. (B19)

126-B. Comminution Plant. (Continued.) F. Lebeter. *Mine & Quarry Engineering,* v. 16, Nov. 1950, p. 355-358; Dec. 1950, p. 391-394.

Concludes section on ball mills. The rod mill, gravity stamps, rolls, hammer mills, and the Lopulco crusher. Final installment: lubrication of crushing and grinding machinery. (B13)

127-B. Gold Milling in Southern Rhodesia; A Review of Current Practice. *Mine & Quarry Engineering,* v. 17, Apr. 1951, p. 121-122. (B13, Au)

128-B. Mining and Milling at Outokumpu, Finland. W. R. Bull. *Mine & Quarry Engineering,* v. 17, Apr. 1951, p. 123-127.

Details, including concentration flowsheets. The ore contains chalcopyrite, sphalerite, pyrite, and pyrrhotite, while the gangue is practically all quartz. Cu, Zn, Au, Ag, and pyrite are recovered. (B12, B13, Cu, Zn, Au, Ag)

129-B. Our Present Knowledge of the Effect of Slag Components on the Viscosity of Smelter Slags. (In German.) F. Brenthel. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Feb. 1951, p. 55-61.

Effects of temperature and composition of steelmaking slags on viscosity, and practical examples of the effects of slag components. (B21, D general, ST)

130-B. New Research Results on the Suitability of Xanthates for Pb-Zn Ore Flotation, Based on an Example of Ruhr-Type Pb and Pb-Zn Sulfide Ores. (In German.) Friedrich Stolze. *Zeitschrift für Erzbergbau und Metallhüttenwessen,* v. 4, Feb. 1951, p. 68-76; disc., Mar. 1951, p. 95-98.

Laboratory and plant experiences. Previous theories. (B14, Pb, Zn)

131-B. Suspension Roasting of Zinc Blende in the Former Biesche A.G. (In German.) Hans Dürr. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Mar. 1951, p. 89-95.

Development of the process, its principles, use, and practical results. Suspension-roasting plants are illustrated. (B15, Zn)

132-B. Concentration of Vanadium in the Beneficiation of Oolithic Iron Ores. (In German.) Helmut Kirchberg. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Mar. 1951, p. 98-104.

Occurrence and abundance of V and the V content of iron ores. On the basis of results of concentration of several different Fe ores, it appears unlikely that V can be concentrated to a high degree by purely mechanical ore-dressing procedures. 10 ref. (B14, V, Fe)

133-B. Separation of Sulfur and Selenium. (In Russian.) M. G. Zhuravleva and G. I. Chufarov. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 24, Jan. 1951, p. 28-31.

Conditions of equilibrium between the liquid and vapor phases in the S-Se system were investigated. Results are of importance in the recovery of Se from flotation tailings from Cu ore beneficiation. It is also necessary to remove the Se from the S to make the latter suitable for certain uses. (B14, Se)

134-B. Fundamental Studies on Interfacial Tensions in Flotations. III. Tilting-Plate Method of Determining Contact Angle and the Wetting Tension of Aqueous Solutions of Frothers for Paraffin-Wax. IV. Suspended-Plate Method of Determining Wetting Tension and the Time Variation of Wetting Tension of Glass at Water-Air Interface. (In English.) Masayoshi Wada. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Feb. 1950, p. 102-149.

Details of methods and of extensive experimental measurements on a variety of reagents. 231 ref. (B14, P10)

135-B. On the Mechanical Pulverizing of Metals by a Special Designed Eddy Mill. (In English.) Tosihiko Okamura, Koji Inagaki, and Yosimichi Masuda. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Apr. 1950, p. 361-369.

Mill in which metals are crushed chiefly by shearing due to mutual friction. Its application to various metals and alloys. Relation between pulverizing work and pulverizing time; relation between crushing work and particle size; variation in particle-size distribution of mill product with treating time; structure of pulverized powders; oxidation of pulverized powder; and temperature rise during pulverizing. (B13, H10)

136-B. Iron Ore Supplies for Steel Production. *Mining Journal,* v. 136, Apr. 27, 1951, p. 393-394.

Plans to develop new iron ore deposits, e.g., in French West Africa and in Sierra Leone, as well as steps taken to lessen Britain's dependence on ore imports. (B10, Fe)

137-B. Testing of Sinter. E. G. Hill and Robert E. Powers. *American Iron and Steel Institute,* Preprint, 1951, 16 pages.

Survey of the literature indicates need for control tests to define sinter properties. Literature data on size, chemical analysis, strength, porosity, permeability, reducibility, magnetic analysis, and microstructure are correlated. A few of the methods have been tried on a laboratory scale and appear promising for control work. 57 ref. (B16, Fe)

138-B. Improving Current Practice in Blast Furnace Sintering. Robert E. Powers. *American Iron and Steel Institute,* Preprint, 1951, 27 pages.

Results of a subcommittee survey of current practice, during which an investigator spent about a year visiting 15 plants and studying their operation. 14 ref. (B16, Fe)

139-B. Operating Factors in Heavy-Media Processing. Part II. L. J. Erck. *Mining Congress Journal,* v. 37, Apr. 1951, p. 88-91.

Technical and economic factors, supplemented by tabular lists of heavy-media plants in operation and under construction for concentration of metallic and nonmetallic minerals and coal. (B14)

140-B. Extraction of Alumina From Haiti and Jamaica Bauxites. T. D. Tiemann. *Journal of Metals,* v. 3, May 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 389-393.

Chemical and mineralogical composition of Caribbean bauxite ores. Extraction of alumina by several processes from both Haiti and Jamaica bauxites. (B14, Al)

141-B. Electric Equipment for Heavy-Media Separation Process. J. J. Bean and K. A. Blind. *Transactions of the American Institute of Electrical Engineers,* v. 69, pt. 2, 1950, p. 1421-1429.

Includes flow diagrams of the entire heavy-media separation plant, as well as diagrams of the separating equipment itself. Operating data on the Dings high-intensity Crockett-type submerged-belt magnetic separator. Tractive force on particles in a magnetic field is calculated. (B14)

142-B. Milling and Refining. *Canadian Mining Journal,* v. 72, Apr. 1951, p. 121-134.

Section of special issue on Kerr-Addison Gold Mines, Ltd. The ore, the mill building, the flow sheet and each of its features, refining, handling of supplies, metallurgical control, research, and personnel. (B13, B14, Au)

143-B. Refractories Problems in Industry. T. P. Mann. *Australasian Engineer,* v. 44, Feb. 7, 1951, p. 83-88.

Approach to the subject from the consumer's point of view. Considerable attention is paid to metallurgical applications. (B19)

144-B. The Uses of Graphite and Carbon in the Engineering and Metallurgical Industries. R. Ogilvy. *Australasian Engineer,* v. 44, Jan. 8, 1951, p. 80-89.

Emphasizes refractory uses as mold-surfacing agents, as linings for chemical-plant equipment, electrical and mechanical applications. (B19, C)

145-B. Refractory Concrete; Some Industrial Applications in Furnace Construction. A. E. Williams. *Iron and Steel,* v. 24, May 1951, p. 160-162.

Typical examples of applications and advantages. Crushing strength, thermal conductivity, and refractoriness under load. (B19)

146-B. Investigation of the Effects of Controlled Variables on Sinter Quality. Part I. Development of Experimental Sinter Plant and Preliminary Results Using Northants Ore. E. W. Voice, C. Lang, and P. K. Gledhill. *Journal of the Iron and Steel Institute,* v. 167, Apr. 1951, p. 393-399.

A sinter pan 2 ft. square was set up using suction from a production Fe sinter plant. Sinter was produced from weighed mixes, the sinter process was observed and the sinter made was examined. Quantitative results show effects on flue dust, returned fines, and coke on sinter strength. Correlation was obtained between effect of moisture content and suction on speed of sintering; and observations were made of bed porosity and air flow before and during sintering. Effects of various fuels. (B16, Fe)

147-B. The Sintering of Northamptonshire Iron Ore; A Production-Plant Study of Factors Affecting Sinter Quality. D. W. Gillings, E. W. Voice, C. Lang, and P. K. Gledhill. *Journal of the Iron and Steel Institute,* v. 167, Apr. 1951, p. 400-439.

Effects and relative importance of factors governing physical properties of the sinter. Control of proportions and properties of raw materials was most important, carbon content of the raw mixture being especially critical. Efficiency of mixing and exclusion of large fragments of ore and coke were next in importance, followed by control of content of returned sinter and of water in the mixed raw materials. Variations of suction had very little effect. (B16, Fe)

148-B. Viscosity Measurements on Synthetic Slags of the System FeO-SiO_2-TiO_2. (In French.) Georges Urbain. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Jan. 22, 1951, p. 330-332.

Technique, apparatus, and results. (B21, ST)

149-B. Preparation of Uranium Metal at the Couchet Plant of the Atomic Energy Commission. (In French.) Charles Eichner, Bertrand Goldschmidt, and Paul Vertes. *Bulletin de la Société Chimique de France,* Jan.-Feb. 1951, p. 140-142.

Purification of uranium compounds leading to production of the oxide. The plant process for the preparation of uranium metal by the action of Ca on UF_4. 19 ref. (B14, C4, U)

150-B. The Iron Ore Problem in the Western Hemisphere. (In German.) Kurt Emil Dittmann. *Archiv für das Eisenhüttenwesen,* v. 22, Mar.-Apr. 1951, p. 73-83.

Survey of assured and possible iron resources, supplemented by numerous maps and tables showing distribution, annual production, composition, and mining costs. 16 ref. (B10, A4, Fe)

151-B. How U.S.V.'s Pine Creek Mine Will Increase Tungsten Output. H. L. McKinley, T. W. Holmes, and L. E. Sausa. *Engineering and Mining Journal,* v. 152, May 1951, p. 76-83.

Mining, milling, and concentration procedures. Includes flow diagrams. Products are W, Mo, and Cu concentrates. (B12, B13, B14, W, Mo, Cu)

152-B. How Granby Increased Mill Capacity by More Than 78%. John Huttl. *Engineering and Mining Journal,* v. 152, May 1951, p. 84-86.

How mill capacity was increased to match greater ore production from the mine of Granby Consolidated Mining, Smelting & Power Co., Ltd. Includes flow sheets of the crushing plant, the grinding section, and the flotation section. Cu concentrates are produced. (B13, B14, Cu)

153-B. Concentration of Oxide Manganese Ores From Lander County, Nev. T. F. Mitchell, R. R. Wells, and W. G. Sandell. *U. S. Bureau of Mines,* Report of Investigations 4780, Apr. 1951, 16 pages.

This deposit is a replacement of sedimentary rock by manganese oxides. Ore occurs in two main ore bodies, which can be mined separately. Laboratory experiments were made on samples from each body. Beneficiation test results and conclusions as to commercial feasibility. (B10, B14, Mn)

154-B. Concentration of Ores by Induced Activities. F. E. Senftle and A. M. Gaudin. *Nucleonics,* v. 8, May 1951, p. 53-59.

How neutron-induced activity may be used as an aid in ore separation. Ore pickers controlled by radiation detectors may be used to isolate pieces of ore rich in particular elements. 10 ref. (B14)

155-B. Hot Metal Cars and Mixers —How to Extend Life of Refractory Linings. Part. I. R. P. Heuer and C. E. Grigsby. *Steel,* v. 128, Apr. 2, 1951, p. 93-94, 96.

Variations in service life, often unnoticed, cause accelerated lining wear in vessels for handling molten pig iron more often than lack of uniformity in the refractories themselves. New theory on rate of wear shows how more hot metal can be handled per lining. First of four articles. (To be continued.) (B1, Fe)

156-B. Research on the Effect of Ultrasonic Vibrations in Flotation Beneficiation. (In German.) Wilhelm Petersen. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Feb. 1951, p. 62-68; Apr. 1951, p. 142-148.

Dispersing, emulsifying, and coagulating effects of ultrasonic vibrations generated by magnetostrictive and piezoelectric generators on the beneficiation of different ores. Practical uses of the method. 17 ref. (B14)

157-B. Selection of Different Washing Methods. (In German.) Theodor Eder. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Apr. 1951, p. 137-142.

Experience and theory prove the superiority of washing of ores and materials with make-up water over that without make-up water. Different washing methods; typical data for quartz sand and galena are tabulated and charted. (B14)

158-B. (Book) Silicate Melt Equilibria. Wilhelm Eitel. 159 pages. 1951. Rutgers University Press, New Brunswick, N. J. (Translated from the German (1942 ed.) by J. G. Phillips, T. G. Madgwick, and R. B. Sosman, with revisions and additions by the author.)

Comprehensive monograph, including an introductory section and sections on binary, ternary, quaternary, and polynary systems. 92 ref. (B21)

159-B. Iron-Ore Beneficiation—Present Practices and Trends. *Iron and Steel Engineer,* y. 28, May 1951, p. 66. (Condensed from paper by Stephen E. Erickson.) (B14, Fe)

160-B. Studies in Cassiterite Flotation. *Bulletin of the Institution of Mining and Metallurgy,* May 1951; *Transactions,* v. 60, pt. 8, 1950-51, p. 341-351.

Discusses above paper by E. J. Pryor and S. A. Wrobel (Mar. 1951 issue; see item 96-B). (B14, Sn)

161-B. Concentration of Tin Ore From the Wild Cherry and Crystal Quarries, Ardlethan, N.S.W. K. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne,* Investigation 394, Aug. 24, 1950, 15 pages.

General problems involved in investigating gravity concentration and the general plan followed in the experimental work. Details of preliminary tests to determine necessary degree of crushing. Results of detailed tests. Work included gravity, magnetic, and electrostatic concentration. (B14, Sn)

162-B. Chromite Investigations. Part I. A Critical Review of Methods of Utilization With Special Reference to Transvaal Ores. I. H. Kahn and A. M. Schady. *Journal of the Chemical, Metallurgical & Mining Society of South Africa,* v. 51, Feb. 1951, p. 247-256; disc., p. 256-260.

Uses of chromite, characteristics of the Transvaal ores, and possible methods of processing them. 35 ref. (B10, Cr)

163-B. Significance and Sources of the Element Fluorine in Basic Bessemer Slags. (In German.) Siegfried Gericke and Bruno Kurmies. *Stahl und Eisen,* v. 71, Apr. 26, 1951, p. 454-457.

Tests show that the F content of basic slag is on the average 0.008% and hardly ever exceeds 0.020% and that F affects the solubility of P_2O_5 only when it exceeds 0.030%. High SiO_2 and low F contents insure high solubility of P_2O_5. Graphs and tables summarize experimental results. (B21, D3, ST)

164-B. Recent and Prospective Sinter Plant Improvements. A. A. Nilsen. *American Iron and Steel Institute,* Preprint, 1951, 13 pages.

Recent development in equipment and procedures for preparation of blast-furnace sinter. Prospective or suggested improvements. (B16, Fe)

165-B. Fundamental Investigation of Steel Plant Refractories Problems. I. Phase Relations in the System $2CaO \cdot SiO_2$-$CaO \cdot SiO_2$-$2CaO \cdot Al_2O_3 \cdot SiO_2$-FeO. Arnulf Muan and E. F. Osborn. *American Iron and Steel Institute,* Preprint, 1951, 35 pages.

Includes phase diagrams, graphs, and tables. (B19, D general, ST)

166-B. Metallurgy of Cobalt Production from Cupriferous Pyrite. Sanai Nakabe. *Journal of Metals,* v. 3, June, 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 445-451.

Process operated for two years at the Besshi mine and smelter (Japanese) on extremely low grade (0.1% Co) pyrite concentrates obtained from Cu ore. Steps in the process were roasting, leaching, precipitation, reduction fusion to crude Co, and finally refining by electrolysis to over 99% purity. (B14, C23, Co)

167-B. Russia's Mineral Potential, Paul M. Tyler. *Mining Engineering,* v. 3, June 1951, p. 494-497.

A critical evaluation. (B10, A4)

168-B. Leucopyrite Flotation. (In German.) Werner Grunder. *Zeitschrift fur Erzbergbau und Metallhuttenwesen,* v.4, May 1951, p. 182-185.

Design and operation of a new leucopyrite flotation plant. Results and costs of the flotation reagents. Includes flow diagrams. (B14, As)

169-B. Determination of the Mechanism of Setting of Quartzite Refractory Linings for Metallurgical Furnaces. (In Italian.) A. Palazzi and F. Savioli. *Metallurgia Italiana,* v. 42, Nov. 1950, p. 410-417.

Recommendations for procedures to obtain optimum results. Hypothesis concerning the mechanism of setting. 12 ref. (B19)

170-B. Metallurgical Treatment of Some Oxidized Antimony Ores. (In Italian.) Pietro Principato. *Metallurgia Italiana,* v. 43, Jan. 1951, p. 17-19.

How a plant, built for the treatment of stibnite, may also be economically designed for treatment of oxidized minerals in general (valentinite, cervantite, etc.) and particularly hydroromeitite, etc. (B14, Sb)

171-B. Victory or Stalemate? Minerals Can Decide. Evan Just. *Engineering and Mining Journal,* v. 152, June 1951, p. 80-84.

Analysis of effects of mineral resources position on a possible war with Russia and her satellites indicates that mineral resources of either the Western Hemisphere or the Soviet sphere are adequate for a resolute defense. However, it is believed that the Communists would have to acquire most of the resources of the rest of the world in order to "pack a knockout punch". (B10)

172-B. How to Simplify Testing for Sink-Float Separation. Stephen E. Erickson. *Engineering and Mining Journal,* v. 152, June 1951, p. 88-89.

Accurate, easily handled new device for testing ores or checking sink-float plant operation. (B14)

173-B. A Promising Lead-Zinc District Awaits Development. Hans Fritzsche. *Engineering and Mining Journal,* v. 152, June 1951, p. 96-101.

German district said to have 30 million tons of 6% ore in sight. Geology, mineralization, mining methods, and concentration flowsheet. (B14, Pb, Zn)

174-B. How the Metalworking Industry Uses LP Gas. Oliver Johnson. *Iron Age,* v. 167, June 14, 1951, p. 96-98.

Survey discloses that the metalworking industry is a fairly substantial user of liquefied petroleum gas. Types of plants which buy it, processes in which they use it, and where they are located. (B18)

175-B. A Calorimetric Method for Studying Grinding in a Tumbling Medium. A. Kenneth Schellinger. *Mining Engineering,* v. 3, June 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 518-522.

Apparatus and procedure. The grinding process may be studied on the basis of heat liberated. Preliminary results for quartz sand. (B 13)

176-B. Beaker Flotation as a Quantitative Tool in Flotation Testing. William Loblowitz. *Mining Engineering,* v. 3, June 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 522-523.

Simplified system of flotation testing developed recently at the Bureau of Mineral Research of Rutgers University. (B 14)

177-B. Approximation of the Energy Efficiencies of Commercial Ball Mills by the Energy Balance Methods. A. Kenneth Schellinger and Rustam D. Lalkaka. *Mining Eningeering,* v. 3, June 1951; *Transactions of the American Institute of Mining and Metllurgical Engineers,* v. 190, 1951, p. 523-524.

Application of method to two commercial ball mills while grinding cement raw materials. (B13)

178-B. Screening and Charging Practice Increases Furnace Yield. A. H. Fosdick. *Steel,* v. 128, June 18, 1951, p. 86, 88, 92, 96.

Effective procedures followed by Bethlehem Steel Co. in splitting iron ores to plus 1-in. lump and ⅜-in. nut, running the fines through the sintering plant, and charging each size in the blast furnaces separately. (B16, D1, Ce)

179-B. Sedimentation. S. Hesling. *International Chemical Engineering & Process Industries,* v. 32, June 1951, p. 273-276.

The theoretical and practical approach to sedimentation problems. Types of equipment used in the complementary operations of sedimentation and thickening. (B14)

180-B. Sodium Chloride in Cyanidation at Renabie. E. G. Kearney and W. J. Fenton. *Canadian Mining Journal,* v. 72, June 1951, p. 63-67.

Treatment of a highly siliceous, low-sulfide Au ore at Renabie, by flotation, jigs, and cyanidation, was previously described. Improvements effected in the treatment during 1950, without changing the basic flow sheet, have resulted in increasing recovery at each stage by approximately 1%, to give an overall recovery of 91% or better. The improvement in recovery by cyanidation is, it is believed, almost entirely due to the addition of common salt to the plant solutions. (B14, Au)

181-B. Pre-Aeration, Cyanidation and Other Metallurgical Investigations of Ore From Big Bell, W.A. H. H. Dunkin and K. S. Blaskett. *Commonwealth*

Scientific and Industrial Research Organization and the Mining Department, University of Melbourne, Ore-Dressing Investigation no. 370, Oct. 5, 1950, 32 pages.

General plan of investigation and details of methods. Results of cyanidation tests in which different factors were varied. Work on the plant tailings sample included screening, flotation, infrasizing of concentrate and tailings and mineralogical examination of the fractions. Mode of occurrence of Au in the residues. (B14, Au)

182-B. Recovery of Tin From Roasted Ore From the Ottery Mine, Emmaville, N.S.W. H. H. Dunkin and K. S. Blaskett. *Commonwealth Scientific and Industrial Research Organization and the Mining Department, University of Melbourne,* Ore-Dressing Investigation no. 390, Oct. 19, 1950, 5 pages.

Results of benefication tests are tabulated. Conclusions are summarized. (B14, Sn)

183-B. Flotation of Silver Ore From the White Rock Mine at Drake, N.S.W. H. H. Dunkin and K. S. Blaskett. *Commonwealth Scientific and Industrial Research Organization and the Mining Department, University of Melbourne,* Ore-Dressing Investigation no. 391, Oct. 18, 1950, 4 pages.

Results of mineralogical examination and flotation tests. (B14, Ag)

184-B. Processes Occurring During the Stirring of Commercial Alumina Hydrates. (In German.) Fr. W. Wrigge and H. Ginsberg. *Zeitschrift für anorganische und allgemeine Chemie,* v. 264, May 1951, p. 285-297.

Inoculation effect of normal $Al(OH)_3$ on the aluminate lyes of the Bayer process for recovery of alumina from bauxite was investigated. The primary constituent in each case is gibbsite. Effectiveness of the gibbsite as an inoculant is explained by the presence of active centers on the crystal surfaces. 65 ref. (B14, Al)

185-B. Oxidation-Reduction Processes During Precipitation of Metals From Cyanide Solutions. (In Russian.) I. N. Plaksin and O. K. Budnikova. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Feb. 1951, p. 267-272.

Experimental investigation, using precipitation of Au and Zn as an example, showed that the presence of O_2 in cyanide solutions has considerable influence on the density of deposition. It was also found that the action of the dissolved O_2 depends on its concentration in solution and on process conditions. (B14, Au)

186-B. Sweden's Iron and Steel Industry. T. L. Joseph. *Journal of Metals,* v. 3, July 1951, p. 507-510.

During the summer of 1950, the author visited several large iron ore mines and steel plants in Sweden. His report covers iron ore, concentrating, sintering, iron production, steel production, and phases of these functions that were developed to meet conditions peculiar to the country. (B general, D general, ST)

187-B. Concentration of the Complex Copper-Lead-Cobalt-Nickel Ores of Southeast Missouri. M. M. Fine, W. E. Brown, G. J. Vahrenkamp, and R. G. Knickerbocker. *Mining Engineering,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 602-604.

Results of a research and development laboratory and pilot-plant mineral-dressing investigation showed that separate concentrates of Pb, Cu, and Co-Ni could be made by grinding and flotation. An industrial plant built subsequently produced such concentrates during the war years. Present commercial production is limited to Pb and Cu concentrates, but research to permit economic utilization of the Co and Ni values is continuing. (B13, B14, Pb, Cu, Co, Ni)

188-B. Simple Treatment Methods for Sulfide Gold and Silver Ores. A. L. Engel. *U. S. Bureau of Mines,* Report of Investigations 4790, May 1951, 17 pages.

Treatment of ore from ten western mines in several districts. Methods used include gravity concentration, amalgamation, flotation, cyanidation, and, in one case, roasting. For the most part, only standard laboratory procedures were employed. (B14, B15, Au, Ag)

189-B. Ore Agglomeration; The Smidth Kiln at East Moors Works, Cardiff. W. E. Simons. *Iron and Steel,* v. 24, June 15, 1951, p. 273-277; disc., p. 315-318.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 76-B, 1951. (B16, Fe)

190-B. Sinter Making; Plant Research at Appleby-Frodingham. G. D. Elliot and N. D. Macdonald. *Iron and Steel,* v. 24, June 15, 1951, p. 278-281; disc., p. 315-318.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 119-B, 1951. (B16, Fe)

191-B. Sinter Quality; Effects of Controlled Variables. Part I. Development of Experimental Sinter Plant

and Preliminary Results Using Northants Ore. E. W. Voice, C. Lang, and P. K. Gledhill. *Iron and Steel,* v. 24, June 15, 1951, p. 282-285; disc., p. 315-318.

Previously abstracted from *Journal of Iron and Steel Institute.* See item 146-B, 1951. (B16, Fe)

192-B. Northants Ore; A Production-Plant Study of Factors Affecting Sinter Quality. D. W., Gillings, E. W. Voice, C. Lang, and P. K. Gledhill. *Iron and Steel,* v. 24, June 15, 1951, p. 285-293; disc., p. 315-318.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 147-B, 1951. (B16, Fe)

193-B. Plant Experiences With the Flotation of Arsenical Cobalt-Nickel Ores and Bismuth Oxide Ores. (In German.) Günther Salzmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, June 1951, p. 222-225.

Plant results show that these ores can be successfully beneficiated in an acid sludge. (B14, Co, Ni, Bi)

194-B. How to Get More Tonnage Through Your Present Mill. J. J. Burns. *Engineering and Mining Journal,* v. 152, July 1951, p. 120-121.

Suggestions on increasing production with existing equipment for size reduction of ores. (B13)

195-B. Check These Equipment Ideas for Greater Mill Production. *Engineering and Mining Journal,* v. 152, July 1951, p. 122-125.

A variety of ideas now in use to make size-reduction and beneficiation plants more efficient. (B13, B14)

196-B. How to Use Quality Control to Improve Mill Production. Adrian C. Dorenfeld and Morton H. Dorenfeld. *Engineering and Mining Journal,* v. 152, July 1951, p. 126-129.

Methods are clarified by graphs. Refers to size reduction and beneficiation of ores. (B13, B14)

197-B. How New Units, New Uses Widen Scope of Sink-Float. *Engineering and Mining Journal,* v. 152, July 1951, p. 130-132.

Question-and-answer survey of the latest sink-float developments. (B14)

198-B. Manganese Concentration From Low Grade Domestic Ore; Nossen Nitric Acid Cycle. Ernest S. Nossen. *Industrial and Engineering Chemistry,* v. 43, July 1951, p. 1695-1700.

Cycle which permits separation of Mn from iron, silica, and other undesirable impurities and decomposition of the formed manganese nitrate solution directly to MnO_2 and HNO_3. Mn recovery is satisfactory in many ores that formerly were inaccessible to treatment. Pilot-plant development of technology of the process in continuous operation. Data for several ores for commercial operation. The product, mainly MnO_2, is suitable for the chemical and dry-cell battery industries. 11 ref. (B14, Mn)

199-B. Mineral Separation by an Electrochemical-Magnetic Method. H. C. G. Vincent. *Nature,* v. 167, June 30, 1951, p. 1074.

Simple method for separation of minerals with a relatively high electrical conductivity in rock powders. It is based on the selective deposition upon these minerals of metallic Fe, in an elctrolytic cell, enabling them to be separated from the nonconducting grains with a magnet. The method has application in the common case where the specific gravity of the constituents is too high for heavy-liquid separation, and electrostatic and dielectric methods, froth flotation, panning, or selective chemical attack are inadequate. (B14)

200-B. The Fluosolid Roaster at Campbell Red Lake Mines, Limited. J. B. McKay. *Canadian Mining and Metallurgical Bulletin,* v. 44, July 1951, p. 457-460.

Construction and operation. The roaster prepares for subsequent cyanidation the bulk flotation concentrate obtained from 400 tons per day of gold ore. (B15)

201-B. Principles of Crushing. Fred C. Bond and Frank E. Briber, Jr. *Pit and Quarry,* v. 44, 1951, p. 173-176, 178.

The theory of crushing, energy input required, particle size distribution, crushability tests, particle shapes, general types of crushing equipment, and the characteristics and limitations of the various types of crushers. (B13)

202-B. Metallurgical Applications of the DorrClone. Frank T. Weems. *Mining Engineering,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 681-690.

The basic operating properties of the above Dutch State Mines cyclone. Certain metallurgical applications exploit these properties. An effective method of controlling the consistency of the DorrClone underflow, and results of performance tests. 13 ref. (B14)

203-B. Comparative Results with Galena and Ferrosilicon at Mascot. D. B. Grove, R. B. Brackin, and J. H. Polhemus. *Mining Engineering,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 691-698.

Conversion to ferrosilicon has reduced heavy-media-separation operating costs, given an improved recovery rate, increased the percentage of the mill feed rejected as a coarse tailing, and provided consistently good results under all feed conditions. Further improvements in metallurgy. (B14, Pb, Fe)

204-B. Hot Metal Cars and Mixers; Selecting Linings for Various Types of Service. Part III. R. P. Heuer, and C. E. Grigsby. *Steel,* v. 129, Aug. 6, 1951, p. 90, 92, 94, 97.

Where conditions are not unusually severe, a dense, stiff-mud high duty fireclay brick laid in sillimanite mortar is most economical; new blast furnace and super-duty fireclay brick are next in line; results with sillimanite and silica types vary; and new high-alumina and unburned magnesite-chrome types show promise. (B19, D1)

205-B. Abrasion of Nine Minerals of Sand Size in Ball Mills. Harold L. Alling. *American Journal of Science,* v. 249, Aug. 1951, p. 569-590.

An attempt was made to investigate mechanical abrasion of nine minerals of sand size treated separately, without water. The results show that ball-mill abrasion reduces size, increases circularity and roundness; and that each mineral has its own peculiarities. 20 ref. (B13)

206-B. Iron Ore Mining, Beneficiation and Reserves. E. W. Davis. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 1-15.

Some of the large iron-ore mines and the techniques used in mining. Types of ore found in various localities and the need for investment of new capital to provide an adequate future iron-ore supply. (B10, Fe)

207-B. Hardinge Heavy Media Separator. W. R. VanSlyke. "Eleventh Annual Mining Symposium," *University of Minnesota,* 1950, p. 2-15.

The apparatus and its use in connection with heavy-media separation of iron ore. Results of pilot-plant tests on various types of Lake Superior ore and plant-operating data accumulated by M. A. Hanna Co., at their Harrison Concentrator, Cooley, Minn. (B14, Fe)

208-B. A Study of the Application of the D.S.M. Cyclone Separator Process to the Problem of Concentrating Fine Iron Ores. Stephen E. Erickson and Earl C. Herkenhoff. "Eleventh Annual Mining Symposium," *University of Minnesota,* 1950, p. 16-20.

The equipment and results of its application to above problem using a continuous pilot-plant operated by Hanna Ore Mining Co. (B14, Fe)

209-B. Abrasion Grinding—Mesaba Range. L. J. Erck, R. C. Ferguson, and A. E. Matson. "Eleventh Annual Mining Symposium," *University of Minnesota,* 1950, p. 21-53.

Abrasion milling is defined as the effect on fine materials of a standard ball mill operated so as to not definitely produce a grind, but rather a liberation of the existing middling particles as well as a scuffing action on the ore particles covered with adhering silica by differential grinding. (B13, Fe)

210-B. Virginia Jig Plant of the Charleson Mining Company. Charles Remer and Michael P. J. Walle. "Eleventh Annual Mining Symposium," *University of Minnesota,* 1950, p. 54-61.

Details of the plant, its methods of operation, and results obtained. Possibilities of application to other iron ores. (B14, Fe)

211-B. A New Machine for Gravity Concentration. E. C. Bitzer. "Eleventh Annual Mining Symposium," *University of Minnesota,* 1950, p. 62-64.

The Weinig Concentrator is modified and improved version of the old Wetherbee iron ore concentrator. Typical laboratory data on an iron ore and a Pb-Zn ore. Both laboratory and pilot-scale test results have been sufficiently encouraging to warrant construction of a large unit to operate on minus ¼-in. iron ore during the 1950 shipping season. (B14, Fe, Pb, Zn)

212-B. Flotation of Lake Superior District Iron Ores. Fred. D. Devaney. "Eleventh Annual Mining Symposium," *University of Minnesota,* 1950, p. 65-71.

Since 1947, although no production Fe-flotation plants have been built, much information has been gained through laboratory pilot-plant tests. Attempts to summarize these developments and to point out some possible applications of the processes. (B14, Fe)

213-B. Agglomeration by the Pelletizing Process. E. W. Davis. "Eleventh Annual Mining Symposium," *University of Minnesota,* 1950, p. 72-75.

Developments in the process, especially major changes in the earlier Grondal process. Data obtained with seven iron ores. (B14, Fe)

214-B. Trends in Blast Furnace Practice. R. P. Towndrow. *Metallurgia,* v. 44, July 1951, p. 17-21.

More and more attention is being devoted to preparation of the ore before charging, in order to improve performance of the furnace. These and other aspects of present-day trends. (B15, B16, D1, Fe)

215-B. The Flotation of King Island Scheelite in Hard Mine Water. R. J. Goldacre. *Australian Journal of Applied Science,* v. 2, Mar. 1951, p. 89-107.

The flotation of scheelite and andradite in hard water was investigated using several collectors. The selective conditions for separation were confined to low pH values. Graphs show relationship between pH and concentration of collector necessary. 28 ref. (B14, W)

216-B. Research on the Efficiency Increase of Moving-Band Sintering Plants. (In German.) Herbert Pohl. *Stahl und Eisen,* v. 71, June 7, 1951, p. 597-605; June 21, 1951, p. 664-669; disc., p. 669-673.

Ore-dressing and other preliminary treatment of material to be sintered; a special experimental sintering plant; also testing of quality, strength, and other physical characteristics of sintered ore; effect of fuel on sintering operation, and control of sintering mixture by changing its composition. 35 ref. (B16, Fe)

217-B. Principles and Operation of the Pan Sintered Process With Especial Reference to Fine Ore Sintering. (In German.) Heinrich Huisken. *Stahl und Eisen,* v. 71, July 5, 1951, p. 701-707.

Conditions for production of high quality pan-sintered iron with good microporosity, high resistance to abrasion, and high degree of oxidation. (B16, Fe)

218-B. Unit Operations Score Again. *Chemical Engineering,* v. 58, Aug. 1951, p. 194, 196-198.

The beneficiation of taconite to get a usable iron ore. Processes employed by various plants. (B14, Fe)

219-B. Concentration of Copper-Gold Ore From the Blue Bag Mine, Glassford Creek, Queensland. K. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne,* Investigation 367, June 20, 1950, 10 pages.

Experimental work on the above ore, which also contained recoverable Ag. Work was confined to flotation and gravity concentration. (B14, Cu, Au, Ag)

220-B. The Recovery of Zircon and Rutile From Weakly Magnetic Minerals From Mineral Deposits Syndicate, Southport, Queensland. S. B. Hudson and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne,* Investigation 383, June 20, 1950, 5 pages.

An investigation made to determine whether high-grade zircon and rutile concentrates could be obtained by magnetic and electrostatic treatment. (B14, Zr, Ti)

221-B. Treatment of a Gravity Beach Sand Concentrate From Associated Minerals, Pty. Ltd., Southport, Queensland. S. B. Hudson and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne,* Investigation 385, June 26, 1950, 6 pages.

An investigation to obtain high-grade zircon and rutile concentrates. An electrostatic separator was used. (B14, Zr, Ti)

222-B. Re-Treatment of Dumps at the Golden Gate Mine, Mathinna, Tasmania. K. S. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne,* Investigation 389, June 29, 1950, 14 pages.

Possible methods of recovering gold from this source. Cyanidation and flotation, with variations in procedure. (B14, Au)

223-B. Studies in Re-Dressing Beach Sand Concentrates From Woodburn, N.S.W. Interim Report 1. Separation of Cassiterite by Electrostatic Concentration. K. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne,* Investigation 392, June 28, 1950, 9 pages.

The separation of cassiterite from beach sand. Non-magnetic, weakly magnetic, and strongly magnetic concentrates were studied. Results of electrostatic and magnetic separation. Further investigations. (B14, Sn)

224-B. Treatment of Ore From the Break O'Day Mine, Ravenswood, Qld. K. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne,* Investigation 395, Nov. 15, 1950, 8 pages.

Amalgamation of ore after fine grinding, flotation of the ore, flotation of table tailings, flotation after amalgamation, and direct cyanidation are the processes investigated. (B14, Au)

225-B. Sorting Plant Cuts Milling Cost 15%. A. A. Smith and Don N. Ferguson. *Engineering and Mining Journal,* v. 152, Aug. 1951, p. 76-77.

New plant of Silver Bell Mines Co., Ophir, Colo. (B13)

226-B. New Wrinkles on an Old Process Are at Work in Colorado Plant of Climax Uranium Co. Blair Burwell and E. J. Duggan. *Engineering and Mining Journal,* v. 152, Aug. 1951, p. 93-94.

Process which includes crushing, grinding, sand-slime separation, drying, salt roasting, leaching in water for V, then in hydrochloric acid for U. Oxides are recovered by precipitation, melting, and casting. (B13, B14, V, U)

227-B. The Effect of Grinding on Particles. Benjamin C. Bradshaw. *Journal of Chemical Physics,* v. 19, Aug. 1951, p. 1057-1059.

Postulates that the well-known limiting distribution of particle sizes, which results from long-continued grinding, is dynamic rather than static. (B13)

228-B. Hot Metal Cars and Mixers; Test Results As a Guide to Lining Selection. Part IV. (Concluded.) R. P. Heuer and C. E. Grigsby. *Steel,* v. 129, Aug. 20, 1951, p. 78, 80, 83-84.

Superior results were obtained from unburned magnesite-chrome brick in several mixers—in this country and abroad—where service conditions are too severe for any other brick. Use of these brick in mixers can be expected to be extended to hot-metal cars. Results with sillimanite brick—which cost about 35% more than unburned magnesite-chrome brick—are still inconclusive. It is probable that dense brick of 70% Al_2O_3, or higher, which cost less than sillimanite brick, will eventually be widely used for slagline sections of mixers too severe for high-duty, high-fired, blast-furnace brick, or high-fired super-duty fireclay brick and yet not severe enough to need unburned magnesite-chrome brick. (B19)

229-B. Session AB. Mineral Resources. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 37-188; disc., p. 189-216.

Consists of the following papers and accompanying discussion: "Mineral Industry of Australia—With Particular Reference to the Past Twenty Years", P. B. Nye, I. C. H. Croll, and D. R. Dickinson; "Some Notes on the Mineral Resources (Excluding Coal) of the Union of South Africa", A. R. Mitchell; "Changes in Canada's Mineral Resources During the Past Ten Years", G. C. Monture; "The Mineral Resources of Malaya and Other Far Eastern Countries", Lewis L. Fermor; "The Mineral Resources of the British West African Colonies", N. R. Junner; "The Mineral Resources of the East African Colonies", Edmund O. Teale; "Mineral Resources of India", D. N. Wadia; "Significant Changes in the Known Position of the Mineral Resources of Southern Rhodesia During the Past Twenty Years", J. C. Ferguson; and "The Mineral Resources of Other Empire Territories", E. H. Beard. (B10)

230-B. Present-Day Trends in Mineral Dressing in Canada. C. S. Parsons and L. E. Djingheuzian. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 673-690; disc., p. 753-767.

Crushing, grinding, and gravity concentration practice; flotation; cyanidation; roasting; scavenging; etc. 11 ref. (B13, B14, B15)

231-B. Mineral Dressing and Cyanidation in Southern Africa. Philip Rabone, editor. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 691-707; disc., p. 753-767.

A series of brief articles as follows: "Gold Ore Treatment on the Witwatersrand", Andrew King; "Treatment of the Refractory Gold Ores of Southern Rhodesia", W. G. Vowles; "Trends in Diamond Recovery Practice", C. Stent; "Copper Concentrating Practice in Northern Rhodesia", H. L. Talbot; "Concentrating Practice at Messina, Northern Transvaal", M. W. Okker; "Concentrating Practice at O'okiep Copper Co. Ltd.", F. J. Martin; "Concentration of the Ores of Rustenburg Platinum Mines, Ltd., Transvaal", F. Wartenweiler; "Pilot Plant for Concentration of Platinum"; "Concentration of Chromite Ores"; and "Concentration of Cassiterite at Rooiberg Minerals Development Co. Ltd., Transvaal", C. G. Blight. (B13, B14, Au, Cu, Pt, Cr, Sn)

232-B. The Underlying Principles of Mineral Dressing. Ian W. Wark. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 708-719; disc., p. 753-767.

Physical and chemical principles. (B13, B14)

233-B. The Lead-Zinc Concentrator of the Zinc Corporation, Ltd., Broken Hill, New South Wales. C. W. Thomas and K. P. W. Parsons. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 720-752; disc., p. 753-767.

Extensive details of the plant and its operation. (B14, Pb, Zn)

234-B. Lead Sintering Practice at Port Pirie. Frank A. Green. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 824-847; disc., p. 1047-1093.

Equipment and procedures. (B15, Pb)

235-B. Some Aspects of the Use of Refractory Materials. F. H. Clews and A. T. Green. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 933-961; disc., p. 1047-1093.

Development of silica and basic openhearth roofs; refractories for Cu smelting and refining; refractories for coal-carbonization plants; refractories for Zn retorts; and zircon, mullite, and high-alumina refractories. 59 ref. (B19, ST, Cu, Zn)

236-B. Metallurgical and Mining Problems in Atomic Energy. John D. Cockcroft. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 1097-1108.

Objectives of an atomic-energy program, nuclear reactors, plutonium, thorium, development of uranium resources, extraction of the metals, and effects of radiation on metals.
(B general, C general, P13, U, Th, Be, Zr)

237-B. Correspondence on the Paper —Ionic Theory of Slag-Metal Equilibria: Pt. I. Derivation of the Fundamental Relationships. *Journal of the Iron and Steel Institute*, v. 168, Aug. 1951, p. 376.

Covers above paper by P. Herasymenko and G. E. Speight. (Item 349-B, 1950). Authors' reply is included. (B21, D general, Fe)

238-B. Plans for Treating Greater Butte Project Ores. F. F. Frick. *Mining Congress Journal*, v. 37, Aug. 1951, p. 42-43, 75.

Leach-precipitation-float process which increases Cu recovery from oxidized ores, in Anaconda Copper Mining Co. project. (B14, Cu)

239-B. Uranium: Swords or Plowshares. *Mining Engineering*, v. 3, Sept. 1951, p. 762-766.

The role uranium can play in either destroying or greatly benefiting mankind. Mode of occurrence and sources for production in the U.S.S.R., Africa, Australia, Canada, and the U. S. (B10)

240-B. Adsorption of Silver Ion by Sphalerite. A. M. Gaudin, H. R. Spedden, and M. P. Corriveau. *Mining Engineering*, v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 780-784.

A preliminary study of silver-ion adsorption by sphalerite in ion-exchange column with influent electrolyte marked with radio-silver. One experiment was made with radio-copper instead of radio-silver. Application to flotation of sphalerite. 19 ref. (B14, Zn)

241-B. Flotation Rates and Flotation Efficiency. Nathaniel Arbiter. *Mining Engineering*, v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 791-796.

Examines the variation in rates for a group of ore separations, shows that a simple rate law appears to govern, and considers the relation of the control variables to the rates. Use of rate constants for evaluation of performance and efficiency. 18 ref. (B14)

242-B. Ore Dressing Research in Australia. *Mining Journal*, v. 237, Aug. 31, 1951, p. 210-211.

Outlines work of Commonwealth Scientific and Industrial Research Organization. (B13, B14)

243-B. Now Blast-Furnace Gas is Base-Load Boiler Fuel. *Power*, v. 95, Sept. 1951, p. 96-98.

How blast-furnace gas is cleaned and utilized as fuel. (B18)

244-B. The Flotation Process. H. Lavers. *Research*, v. 4, Sept. 1951, p. 396-401.

Development of flotation process and reagents. Present status of differential flotation, flotation of oxidized ores, cleaning of coal by flotation of sulfur, and flotation machines. (B14)

245-B. Contemporary Status of the Theory of Flotation. (In Russian.) I. N. Plaksin. *Izvestiya Akademii Nauk SSSR.* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1951, p. 452-465.

Developments in the flotation-concentration method in application to different ores. Contributions of particular Soviet scientists. (B14)

246-B. (Book) **Fourth Empire Mining and Metallurgical Congress, Proceedings. 2 Vols.** F. Higham, editor. 1139 pages. 1950. The Congress, 436 Salisbury House, Finsbury Circus, London, E.C. 2, England. £1 per volume.

The Congress was held in Great Britain, July 9-23, 1949. Technical sessions and papers given in Vol. I cover mineral resources, prospecting methods, physiological and psychological effects of heat and humidity on workers in deep mines and metallurgical plants, and petroleum. Vol. II covers coal, trends in mineral dressing, metallurgy, and metallurgical industries. Selected papers are individually abstracted. (B general)

247-B. (Book) **Tonerde und Aluminium.** (Alumina and Aluminum.) W. Fulda and H. Ginsberg. 226 pages. 1951. Walter de Gruyter & Co., Berlin W. 35, Germany. $6.20.

Equipment and practices of the German alumina plants of World War II, chiefly use of the European (monohydrate) bauxites, with only brief discussions of American practice with trihydrate bauxites. Previously unpublished detail on German Bayer process practice, including a detailed description of the continuous "tower process" developed and commercialized early in the war. Composition and behavior of the various European bauxites, and process variations involved in changing from one to another. Other processes covered are the sinter process, using either soda or Na_2SO_4, and its combinations with the Bayer process; the Pedersen and similar processes; and the Haglund (electrothermal) process. (B14, B16, C23, Al)

248-B. Notes on Ore Dressing Practice at North Broken Hill Limited. W. R. Miller. *Australasian Institute of Mining and Metallurgy, Proceedings,* Sept. 30-Dec. 31, 1948, p. 41-99.

A comprehensive survey of methods and practices in the recovery of Pb, Ag and Zn. Factors influencing the grade of concentrate products, plant control and costs. (B14, Pb, Ag, Zn)

249-B. More Plant for More Alloys for More Steel. *Business Week,* Oct. 6, 1951, p. 66-68, 73-74, 76.

New plant being built at Marietta, Ohio, by the Union Carbide & Carbon Corp. will increase the capacity of the Electro Metallurgical Division. Demand for ferro-alloys in the steel industry with particular reference to low-carbon ferrochrome, an alloy which helps cut down corrosive attack. (B22, AY, Fe-n)

250-B. Increased Metal Output, Improved Product Quality, Increased Furnace Life Through New Developments in Metallurgical Refractories. W. F. Rochow and J. S. McDowell. *Journal of Metals,* v. 3, Oct. 1951, p. 846-853.

Selection of refractories for nonferrous furnace construction. Properties of basic refractories are graphed and tabulated. Tests were made on the action of CuO_2 on basic brick of various types and on several other refractories. (B19, C21)

251-B. Tungsten: A Critically Needed Defense Element. Chung Yu Wang. *Journal of Metals,* v. 3, Oct. 1951, p. 854-857.

Production and applications to industry. Methods of beneficiation of the raw material and future sources. (B10, B14, T general, W)

252-B. The Stuerzelberg Process. C. W. Jensen. *Mining Magazine,* v. 85, Sept. 1951, p. 144-146.

Process was developed in Germany to treat cinders of Meggen pyrites in a revolving furnace in order to recover their iron content in the form of a refined pig iron (low in S and P) and their Zn content in the form of zinc oxide. The process and its advantages. (B15, Fe)

253-B. Potential Sources of Iron Ore Bolster Conservation Program. Owen R. Rice. *Steel,* v. 129, Oct. 1, 1951, p. 88, 91.

The depletion of iron-ore reserves in the U. S. Potential sources are considered. (B10, Fe)

254-B. Calcium Cyanamid; A Source of Nitrogen in Steel. *Steel,* v. 129, Oct. 8, 1951, p. 138, 140.

Experience shows that nitrogen promotes aging or precipitation hardening, affects grain sensitivity and increases hardness and tensile strength of steel. Methods of introducing nitrogen by additions of calcium cyanamid; its composition and availability. (B22, D general)

255-B. Colloid-Chemical Problems in the Separation of Red Mud From Aluminate Solution; Under Conditions of the Bayer Process. (In German.) E. Herrmann, I. Dvornik, O. Korelic, and V. Matkovic. *Kolloid Zeitschrift,* v. 123, July 1951, p. 22-33.

Experiments to discover cause of, and method of eliminating, the poor classification of red mud. An effective method of accelerating the settling of the sludge was determined. The colloidal character of the "mud" is briefly discussed. (B14, Al)

256-B. Reducibility of Ferrous Metals With High Titanium Oxide Content. (In Portuguese.) George Soares de Moraes. *Boletim da Associacao Brasileira de Metais,* v. 7, Apr. 1951, p. 161-175.

Minerals containing 60% Fe and 13.6% TiO_2 were studied with particular emphasis on rate of reduction at various temperatures. 26 ref. (B14, Fe, Ti)

257-B. The Production of Alumina from Alunite. N. S. Bayliss, W. E. Ewers, and G. L. Miles. *Australian Journal of Applied Science,* v. 2, June, 1951, p. 267-275.

A process for producing pure alumina from alunite is proposed. The residues obtained after extracting K_2SO_4 from calcined alunite are leached with hot HCl, hydrated $AlCl_3$ is precipitated from the solution by increasing the concentration of HCl to 30%, and the chloride is ignited to give $Al_2O_3 \cdot HCl$, and water. Several steps in the process were tested in a pilot-plant scale. (B14, Al)

258-B. Ferrochromium From Low Grade Ore Finds Wide Use. J. J. Grady. *Iron Age,* v. 168, Oct. 18, 1951, p. 95-98.

Properties and applications of exothermic ferrochromium alloys made from low-grade ores by the Udy process. Various advantages. (B22, D general, ST, Fe-n)

259-B. Destruction of Flotation Froth With Intense High-Frequency Sound. Shiou-Chuan Sun. *Mining Engineering,* v. 3, Oct. 1951, *Transaction of American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 865-867.

Data indicate that sound waves can be employed for continuous and instantaneous defrothing. A powerful high-frequency siren was used. 12 ref. (B14)

260-B. Tungsten. Chung Yu Wang. *Mining Engineering,* v. 3, Oct. 1951, p. 853-856.

Previously abstracted from *Journal of Metals.* See item 251-B, 1951. (B10, B14, T general, W)

261-B. Mineralogical-Microscopic Investigation of Extremely Fine Beneficiation Products. (In German.) Hans Ehrenberg. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Aug. 1951, p. 285-293.

Object of the studies was to determine suitability of polarization, beneficiation, and "Ultrapak" microscopes for above purpose. The beneficiation microscope was found suitable for the rapid study of fine opaque and transparent minerals of all kinds. Photographs, photomicrographs (some in color), and tabular data. (M21, B14)

262-B. Three-Phase A. C. Can Improve Fine-Size Magnetic Separation. Sven Eketorp. *Engineering and Mining Journal,* v. 152, Oct. 1951, p. 82-83, 118.

Construction details and operational data on a magnetic separator built to operate on 3-phase a. c. It has been used for concentration of magnetites as well as iron powder. 14 ref. (B14, Fe)

263-B. Agglomeration. *Chemical Engineering,* v. 58, Oct. 1951, p. 161-174.

Comprehensive report on process used in a wide variety of industrial operations. Main sections cover pressure compacting to make tablets, bricks, blocks, briquettes, etc.; extrusion of plastic masses in ceramics and chemical technology; forming spheres by tumbling (carbon-black pelletizing); granulation of fertilizers, pelletizing of ores and coal; and sintering of ores. 22 ref. (B16, H10)

264-B. Processing Aluminum Ore. Evans W. Buskett. *Mining Congress Journal,* v. 37, Oct. 1951, p. 32-34, 90.

Procedures and equipment for recovery of Al metal from bauxite, using the Bayer process and its modifications. (B14, Al)

265-B. Taconite Iron Units for the Future. *Mining World,* v. 13, Oct. 1951, p. 20-23.

Present taconite beneficiation operations, research programs, and future prospects. (B14, Fe)

266-B. Foreign Sources of Iron Ore. *Mining World,* v. 13, Oct. 1951, p. 36-41.

An illustrated survey. (B10, Fe)

267-B. Iron Ore Beneficiation Expands; Finer Sizes Subject of Study. *Mining World,* v. 13, Oct. 1951, p. 47-50.

Treating wash ores, selective media concentration, heavy media separation, abrasion milling, Humphreys spiral, Weining concentrator, DSM cyclone separator, jigging, magnetic concentration, milling nonmagnetics, agglomeration, and dust collection. (B13, B14, Fe)

268-B. Measuring the Viscosity of Ferrous Slags. (In French.) M. D. E. Jonckers. *Métallurgie et la Construction Mécanique,* v. 83, Apr. 1951, p. 235, 237, 239-240; May 1951, p. 341, 343, 345, 347, 349.

Various viscosimeters are diagrammed; viscosities of slags in binary, ternary, and quarternary systems are investigated. Concluding part deals with blast furnace and basic bessemer slags. (B21, D1, D3, ST)

269-B. The Development of Mining and Ore Beneficiation in Bolivia During the Last Ten Years. (In German.) Friedrich Ahlfeld, and Richard Knobler. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Aug. 1951, p. 293-296.

Emphasis is on tin ores, but mention is also made of W, Ag, Pb, Zn, Sb, and Cu. (B general, Sn, EG-a)

270-B. Briquetting of Ore Fines for Steel Plants. (In Polish.) K. Radzwicki, W. Madej, and W. Stronczak. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 3, 1951, p. 173-181.

Details of laboratory and industrial tests. Jarcho's method was modified by replacement of NaCl with H_2SO_4 or spent pickle liquor containing H_2SO_4. (B17, Fe)

271-B. Columbium and Tantalum in Austenitic Stainless Steels. Jerome Strauss. **Columbium-Tantalum Alloys and Their Use in Type 347.** H. A. Grove. *ASTM Bulletin,* Oct. 1951, p. 17-19.

Data show that the substitution of the presently available 40% Cb, 20% Ta ferroalloy for the standard

type of ferrocolumbium previously used is practicable. Mechanical properties and corrosion resistances of the steels thus produced are tabulated and charted.
(B22, Q general, R general, SS, Fe-n)

272-B. Examination of Manganese Ore From Fiji. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne,* Investigation 309, Jan. 4, 1951, 2 pages.

Possibility of using simple means of concentration to separate high-grade concentrates. (B14, Mn)

273-B. Flotation of Antimonial Ore From Metz Gold Mines, Hillgrave, N. S. W. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne,* Investigation 344, Feb. 8, 1951, 3 pages.

Data are tabulated on single-stage flotation tests showing the effect of PbAc and $CuSO_4$ as activators and the effect of varying degrees of grinding. (B13, B14, Sb, Au)

274-B. Use of Iron Ore in Steelmaking. J. E. Arthur. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 5-7; disc., p. 7.

Use as a source of oxygen. Reviews the composition of existing domestic deposits. An approximate analysis of South American ores is also given. (B22, B10, ST)

275-B. More Titanium Oxide Now Available. Part I. and II. D. I. Brown. *Iron Age,* v. 168, Nov. 1, 1951, p. 119-123, Nov. 8, 1951, p. 129-132.

Part I: Allard Lake ilemite, which contains 35% TiO_2 and 40% Fe and is the only large deposit of this particular type known. Part II: An electric furnace 54 ft. long equipped with six electrodes is used to make a high-TiO_2 concentrate. A slag containing about 75% TiO_2 and Fe is tapped from this furnace. The feed ore is crushed, mixed with anthracite coal and gravity fed into the furnace through a sprung arch roof. The furnace is all-basic brick and operates as a sealed unit under slight pressure. (B10, B15, Ti, Fe)

276-B. A Method for Handling Steelmaking Slag. *Iron and Steel Engineer,* v. 28, Oct. 1951, p. 85-89.

Method developed at Consett Iron Works, England, and originally intended to improve the handling of flushing slag. The granulated product is sintered and used as blast-furnace charge material.
(B21, D1, Fe)

277-B. Design and Operation of National Tube's Sintering Plant. E. O. Austermiller and W. A. Cureton. *Iron and Steel Engineer,* v. 28, Oct. 1951, p. 111-117, disc., 117-118.

Plant layout, raw materials, sintering practice, and future considerations. A flowsheet of the plant is given. (B16, Fe)

278-B. Sintering Practice at Josephtown Smelter. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1045.

Discussion of above paper (by H. K. Najarian, Karl F. Peterson, and Robert E. Lund). (Feb. 1951 issue, see item 32-B, 1951.)
(B16, C21, Zn, Cd)

279-B. Control of Tailings From Washing Plants. Walter B. Lenhart. *Rock Products,* v. 54, Oct. 1951, p. 113, 148.

The crushing-grinding operation and concentrator of Ray Mines Div., Kennecott Copper Corp., Ray, Ariz. The ore treated is a porphyry and the specific gravity of the tailings and fineness parallels those of other copper porphyry operations.
(B13, Cu)

280-B. Sources and Uses of Zinc. *Westinghouse Engineer,* v. 11, Nov. 1951, p. 186-189.

Surveys world resources, with emphasis on those available to the U. S. Uses and relative amounts devoted to each. Production methods.
(B10, T general, Zn)

281-B. Properties of "Silex" Insulating Refractories. (In French.) M. Rocco. *Circulaire d'Informations Techniques,* No. 9, 1951, p. 1041-1045.

"Silex" refractory bricks are made from sintered rice hulls. Their pores are 20 times smaller than those of diatomaceous earths. Their various properties and possibilities of application, particularly in the open-hearth. (B19, D2, ST)

282-B. Recent Progress in the Wet Beneficiation of Acidic Ores. (In German.) Arnold Goltz. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, Aug. 1, 1951, p. 717-718.

Procedure applied to iron ore from the Salzgitter ore includes a flow chart of the operation. Process is claimed to be so efficient that relatively low-grade iron ores can successfully compete with high-grade foreign ores. (B14, Fe)

283-B. Beneficiation of Siegerland Siderite Sludges. (In German.) Gerhard Gerth. *Zeitschrift für Erzbergbau und Metallhuttenwesen,* v. 4, Sept. 1951, p. 334-337.

These sludges, which previously could not be utilized, can now be concentrated by the nozzle centrifuge, by the hydrocyclone separator,

and by the hearth-beneficiation method. Materials recovered amount to 5400 tons of Fe and 1100 tons of Mn per year. The hearth-beneficiation method is shown to be most suitable for the particular case. (B14, Fe, Mn)

284-B. Research on Flotation of Arsenic-Rich Lead-Zinc Ores. (In German.) Werner Gründer and Bela Bunji. *Zeitschrift für Erzbergbau und Metallhuttenwesen,* v. 4, Sept. 1951, p. 341-344.

Small and large-scale flotation experiments designed to repress the As-bearing minerals and to reduce the arsenopyrite content of the lead blends. Flow charts and typical results. (B14, Pb, Zn)

285-B. Sherritt Gordon Develops Lynn Lake Nickel-Copper. Howard L. Waldron, Editor. *Engineering and Mining Journal,* v. 152, Nov. 1951, p. 72-78.

Geology, use of electromagnetic surveying, new reserves discovered, and new method for concentration. Basically the process consists of simultaneous oxidation and ammonia leaching of the green concentrates to produce soluble Ni, Co, and Cu compounds. Ni and Co are recovered in powder form. Advantages as opposed to conventional methods are low operating costs; high recovery of pure Co; and 75% recovery of sulfur as ammonium sulfate. (B14, Ni, Co, Cu)

286-B. Finding a Way to Handle the HMS Middlings Problem. E. C. Bitzer. *Engineering and Mining Journal,* v. 152, Nov. 1951, p. 91-95.

The Akins heavy-media separator has successfully been used to concentrate an iron-ore middling, but has failed to provide satisfactory results with a Zn ore. A series of tests was made to define the ability of the separator to produce a true middling product, and to determine the control factors involved. (B14, Fe, Zn)

287-B. Mineral Status of the Far East. Kung-Ping Wang. *Mining Engineering,* v. 3, Nov. 1951, p. 943-948.

Mineral production and resource picture of China, Japan, Korea, and Formosa; Hong Kong, Indo-China, Thailand, Burma, Malaya, Indonesia, the Philippines, and British Borneo. (B10)

288-B. "Russia's Mineral Potential" Criticized. Norman C. Stines. *Mining Engineering,* v. 3, Nov. 1951, p. 949-950.

Severely criticizes article by Paul Tyler in the June issue. (See item 167-B, 1951.) In view of residence and personal experience in the Russian mining industry in the period 1909-1919, writer believes the present mineral productive capacity of Russia is to be greatly exaggerated by Mr. Tyler. (B10, A4)

289-B. The Metal Mining Industry in Japan. Robert Y. Grant. *Mining Engineering,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 953-960.

History of metal mining in Japan and the characteristics of the industry as they existed from 1925 to 1945. Mining and milling operations. Role of the Japanese Government. Post-hostilities conditions and the present state of the industry. A short section discusses ore-dressing practice. (B12, B14, A4)

290-B. Collector Mobility and Bubble Contact. M. D. Hassialis and C. G. Myers. *Mining Engineering,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 961-968.

Nature of a collector-coated mineral surface has been the subject of some experimentation and much speculation. Recognized elements of the problem are: nature of the forces holding these units to the mineral surface; orientation of the chemical units at the surface; and disposition of the collector units at the mineral surface. A new and heretofore unrecognized element is mobility of the collector units in the two dimensions of the solid-liquid interface. A series of experiments was made on galena particles. 22 ref. (B14)

291-B. Progeny in Comminution. A. M. Gaudin, H. R. Spedden, and Douglas F. Kaufman. *Mining Engineering,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 969-970.

Application of radioactive Na as a tracer in study of grinding of albite. As a result, it is possible to trace the "progeny" of particles in the various size ranges. (B13)

292-B. Jaw Crusher Capacities, Blake and Single-Toggle or Overhead Eccentric Types. D. H. Gieskieng. *Mining Engineering,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 971-974.

Capacity characteristics of jaw crushers. No attempt is made to discuss other characteristics, such as power consumption or screen analysis of product. (B13)

293-B. A New Surface Measurement Tool for Mineral Engineers. *Mining Engineers,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 981-983.

Discussion of above paper (by F.

W. Bloecher, Jr.) See item 86-B, 1951. (B general, S15)

294-B. A New Theory of Comminution. *Mining Engineering,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 983-986.

Discussion of above paper (by F. C. Bond and J. T. Wang.) See item 236-B, 1950. (B13)

295-B. Comparative Results With Galena and Ferrosilicon at Mascot. *Mining Engineering,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 986-987.

Discussion of above paper (by D. B. Grove, R. B. Brackin, and J. H. Polhemus.) See item 203-B, 1951. (B14, Pb, Fe)

296-B. The Probability Theory of Wet Ball Milling and Its Application. *Mining Engineering,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 988-990.

Discussion of above paper (by Elliott J. Roberts.) See item 4-B, 1951. (B13)

297-B. Progress Report on Grinding at Tennessee Copper Co. *Mining Engineering,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 990-991.

Discussion of above paper (by J. F. Myers and F. M. Lewis.) See item 194-B, 1950. (B13)

298-B. Flotation Rates and Flotation Efficiency. *Mining Engineering,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 991-992.

Discussion of above paper (by Nathaniel Arbiter.) See item 241-B, 1951. (B14)

299-B. Flotation Tests on Korean Scheelite Ore. *Mining Engineering,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineefs,* v. 190, 1951, p. 992-993.

Discussion of above paper (by Will Mitchell, Jr., C. L. Sollenberger, and T. G. Kirkland.) See item 16-B, 1951. (B14, W)

300-B. Geology of Uranium Deposits—A Condensed Version. Donald L. Everhart and Muriel Mathez. *U. S. Atomic Energy Commission,* RMO-732, May 1951, 33 pages.

General geologic features of some of the major types of deposits, together with examples. Their radioactivity characteristics, suggested sampling procedures, and means of evaluating the deposits. Tables give current data on common uranium minerals. (B10, B11, U)

301-B. Studies in the Carbonate-Uranium System. Part II. The Solubility of Sodium Uranyl Tricarbonate in Solutions of Certain Sodium Salts. K. B. Brown and J. M. Schmitt. *U. S. Atomic Energy Commission,* AECD-3229, Oct. 20, 1950, 27 pages.

Data are considered in their application to plant processes such as those employed in the carnotite mill at Monticello, Utah. (B14, U)

302-B. Studies of Recovery Processes for Western Uranium Bearing Ores. IX. Precipitation of Yellow Cake and of Low Level Vanadium. Emily L. Leyshon and C. F. Coleman. *U. S. Atomic Energy Commission,* AECD-3223, Nov. 9, 1950, 35 pages.

Summarizes studies made during the period Apr.-Oct., 1949, on the precipitation of "yellow cake", a sodium uranyl vanadate, from carbonate leach liquors. Also includes briefer studies of several methods of precipitating vanadium from the resulting "purified liquor", including hydrolytic precipitation after reduction, phosphate precipitation after reduction, precipitation of ferrous or ferric vanadate, and precipitation of "red cake" (a sodium polyvanadate) together with the yellow cake. (B14, U, V)

303-B. An Investigation Into the Removal of Arsenical Minerals From Broken Hill Gravity Concentrates. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines,* Report 412, Nov. 3, 1950, 15 pages.

Results show that almost complete elimination of arsenical minerals can be made by suitably conditioning the material and by table flotation. (B14, As, Pb)

304-B. Tests to Determine a Method of Concentration of a Lead Dump, Baddera Lead Mine, Northampton, W. A. *Commonwealth Scientific and Industrial Organization and Kalgoorlie School of Mines,* Report 460, Dec. 19, 1950, 5 pages.

Data in tabular form. Methods used were tabling and jigging. (B14, Pb)

305-B. Recovery Tests on Gold-Copper Tailings From Paris Group (GML's 5311 and 5500, Coolgardie Goldfield) **Widgiemooltha, W. A.** *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines,* Report 478, Feb. 8, 1951, 6 pages.

Grinding, straking, and flotation tests were carried out on a combined bulk sample of the tailings to determine possible gold and copper recoveries. (B13, B14, Au, Cu)

306-B. Treatment of Manganous Slimes and Ores With Sulfur Dioxide. (In Russian.) V. M. Kakabadze. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 24, Mar. 1951, p. 252-263.

Influence of temperature, time, fineness of grinding, ratio of solid to liquid phases, and concentration and amount of SO_2 on the formation of $MnSO_4$ and MnS_2O_6 was experimentally investigated. Results and experimental installation. 49 ref. (B14, Mn)

307-B. Modern Hammer Mills for Size Reduction of Ores. (In Swedish.) E. Rothelius. *Jernkontorets Annaler*, v. 135, No. 6, 1951, p. 229-238.

Includes diagrams of modern hammer mills, performance curves, and tables. (B13)

SECTION C

NONFERROUS EXTRACTION and REFINING

1-C. A Method for the Preparation of High-Purity Indium Metal. T. A. A. Quarm. *Bulletin of the Institution of Mining and Metallurgy,* Dec. 1950, *Transactions,* v. 60, pt. 3, 1950-51, p. 77-80.

Indium, containing Tl, Cd, Pb, Sn, Cu, and Ag, was given two treatments with $SnCl_2$-NH_4Cl slag. Tl dissolves first and is discarded; Cd and most of the In dissolve in the second slag, leaving other impurities in the residue. The slag decomposes in water with the precipitation of finely divided In metal; the Cd and some In remain in solution. The pulp is acidified to coagulate the metal particles and to dissolve any products of hydrolysis. Before melting, the sponge is electrolyzed to clean and compact the metal. Purity of the In is 99.999%. (C4, In)

2-C. Multiple Casting; Continuous Production of Billets and Bars. W. Helling and F. Gassner. *Metal Industry,* v. 77, Nov. 24, 1950, p. 215-217; Dec. 1, 1950, p. 243-245; Dec. 8, 1950, p. 262-265. Translated from *Metall.*

Previously abstracted from original under similar title. See item 30-C, 1950. (C5, Al)

3-C. An Economic Method for Development of a New Technique; Development of Amalgam Chemistry. (In German.) E. Kuss. *Angewandte Chemie,* v. 62, Nov. 21, 1950, p. 519-526.

Shows that neither the Tainton nor the New Jersey processes are economical methods of processing chloride-containing zinc solutions. The amalgam process for producing Zn white and metallic Zn can be economically applied to a variety of other processes. Among these are: separation of Bi and Pb; refining of Tl by preparation of a Cd-Tl amalgam, followed by distillation; powdered-metal recovery; production of special irons having desired magnetic properties or for use as catalysts; Mn production; decomposition of solid amalgams and preparation of alloys, for example, Cu-Mn alloys; treatment of Zn scrap; and treatment of complex ores without flotation. (C29, H10)

4-C. The Ruthenburg Process for Precious Metal Recovery. C. C. Downie. *Mining Journal,* v. 235, Dec. 15, 1950, p. 587-588.

Ruthenburg process has been known for a long time, but has received little attention. It was originally introduced for reducing low-melting-point metals from alkali fusions by means of carbon. How it has been modified for successful application to precious metals. (C21, EG-c)

5-C. Smelting of a Scheelite Concentrate Containing Sulfur Using Sawdust as Fuel. (In Portuguese). Tharcisio D. de Souza Santos and Carlos Dias Brosch. *Boletim da Associacao Brasileira de Metais,* v. 6, July 1950, p. 232-240.

Results of laboratory experiments on production of ferrotungsten from scheelite containing up to 3.78% S in the form of sulfur. (C21, W, Fe-n)

6-C. Description of Electrolytic Refining of Silver Furnished by National Lead Refineries. (In Portuguese.) Tharcisio D. de Souza Santos, Ivo Jordan, and Venancio Ferreira Alves. *Boletim da Associacao Brasileira de Metais,* v. 6, July 1950, p. 273-289.

Process using cells of the Moebius type. This silver was obtained as a byproduct of lead refining from Pb-Ag ores of the Sao Paulo region. Conditions of refining and results. (C23, Ag)

7-C. Desilverization of Lead Bullion —Literature Report No. 13. P. I. A. Narayanan and M. C. Sen. *Journal of Scientific & Industrial Research,* v. 9A, Nov. 1950, p. 408-411.

Various methods. Concludes that the Parkes process is simplest, but

that before addition of Zn, the furnace Pb must be thoroughly softened by removal of impurities like Fe, Cu, Sb, etc. (C21, Pb, Ag)

8-C. Extraction of Germanium from Sphalerite Collected from Nepal. Part II. R. K. Dutta and S. N. Bose. *Journal of Scientific & Industrial Research,* v. 9B, Nov. 1950, p. 271-272.

Chemical method for extraction of Ge from the non-magnetic fraction of sphalerite. (C general, Ge)

9-C. Minerals From the Sea. C. M. Shigley. *Journal of Metals,* v. 191, Jan. 1951, p. 25-29.

Development of processes for recovery of various minerals, from common salt to Br and Mg recovery. Considerable detail concerning procedures and equipment for the last two. (C22, C23, Mg)

10-C. Contribution to the Metallurgy of Chromium. W. J. Kroll, W. F. Hergert, and W. R. Carmody. *U. S. Bureau of Mines,* Report of Investigations 4752, Dec. 1950, 19 pages.

Investigation undertaken to study a number of unconventional methods for making Cr to determine whether production cost could be lowered. More recent processes include carbon reduction of the oxide in vacuum, nitride dissociation, fusion electrolysis of the chloride, amalgam method, iodide dissociation, Ca reduction of the oxide, H_2 reduction of the chloride, and reduction of this compound with Zn and with Mg. Methods are compared. 42 ref. (C general, Cr)

11-C. Production of Thallium in the Zinc Smelter at Magdeburg. (In German.) Walter Langner and August Göbel. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Nov. 1950, p. 370-374.

A new method for extracting highly pure Tl from zinc blende. Protective measures against Tl poisoning. A rapid volumetric method for determining the Tl content of the extract. Flow charts and a schematic diagram.
(C21, S11, Tl, Zn)

12-C. (Book) **Die Verhüttung von Aluminiumschrott.** (The Smelting of Aluminum Scrap.) Kurt Schneider. 202 pages. 1950. Metall-Verlag G.m.b.H., Berlin W.15, Germany. 12.50 DM.

First of a series of monographs on subjects of wide general interest to be edited by M. H. Haas. Begins with some statistical information. Chapters follow on preparation and sorting of scrap, including special treatments required for turnings, foil, and dross; on furnaces; melting practice; refining; and on methods of casting ingots, slabs and billets, and the production of granules. Concluding chapters deal with production of alloys and of the necessary hardeners, with utilization of by-products, and an outline of analytical and test methods. Footnote, references. (C21, A8, Al)

13-C. Preliminary Study of the Recovery of Alumina From Oregon Laterites. J. S. Chittenden and R. W. Moulton. *Trend in Engineering at the University of Washington,* v. 3, Jan. 1951, p. 18-22.

Results of experimental work on the Pedersen electric-furnace process. The factors investigated were: optimum carbon-laterite ratio; effect of limestone on amount of Al_2O_3 recovered; amount of iron ore added to the charge; temperature and time of reaction; and optimum conditions for extraction of Al_2O_3 from the slag. 13 ref. (C21, Al)

14-C. Continuous Casting Process Employs a Moving Mold. D. I. Brown. *Iron Age,* v. 167, Jan. 25, 1951, p. 53-55.

Improved Hazlett process and equipment, which incorporate a moving rather than a stationary or oscillating mold. Water-cooled steel bands traveling over drum pulleys form the mold. The mill requires very little space and power requirements are low. Production machines for brass and aluminum are under consideration. (C5, Cu, Al)

15-C. The Solubility of Lead in Zinc Sulphate Solutions. C. W. Barker, J. Powell, and R. S. Young. *Journal of the Society of Chemical Industry,* v. 69, Dec. 1950, p. 362-363.

Small quantities of Pb are almost invariably present in the purified $ZnSO_4$ solution which constitutes the electrolyte in Zn refineries. Hence results of investigation of the solubility of Pb in $ZnSO_4$ may be of interest to workers in various mining and metallurgical industries.
(C23, P13, Zn)

16-C. Influence of Cathodic and Anodic Current Densities on Current Flow During Electrolysis of Fused Lead Chloride. (In Russian.) G. A. Abramov and V. S. Zernyakov. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Oct. 1950, p. 1056-1066.

Apparatus and experimental data. (C23, Pb)

17-C. Preparation of Titanium Tetrachloride From Rutile. C. H. Gorski. *Journal of Metals,* v. 191, Feb. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 131-133.

Method consists of reducing rutile with coke and chlorinating the reduced product at 200-500° C. The crude distillate is purified by treatment with Cu powder and distillation. Recoveries exceeding 90% of the titanium in the rutile were obtained. (C4, C22, Ti)

18-C. Metallurgical Reactions of Fluorides. Herbert H. Kellogg. *Journal of Metals,* v. 191, Feb. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 137-141.

Graphs representing standard free energy of formation as a function of temperature for 21 fluorides, along with estimated values for 20 additional fluorides. A few possible uses of these data in metallurgical calculations, including fluorination of oxides, sulfides, and chlorides, and reduction of metal fluorides. 19 ref. (C4)

19-C. The Preparation and Some Properties of Curium Metal. J. C. Wallmann, W. W. T. Crane, and B. B. Cunningham. *Journal of the American Chemical Society,* v. 73, Jan. 1951, p. 493-494.

Curium metal has been prepared on a microgram scale by reduction of curium trifluoride with Ba vapor at 1275° C., using a vacuum furnace and double crucible system similar to that described by Fried and Davidson. Six successful reductions, which yielded bright metallic globules of metal ranging in mass from about 0.01 to 4 g. were made. The metal is silvery in appearance and about as malleable as plutonium prepared under the same conditions. (C25, Cm)

20-C. Refining Lithium by Vaporization at Low Pressure. R. R. Rogers and G. E. Viens. *Canadian Mining and Metallurgical Bulletin,* v. 44, Jan. 1951, p. 15-20; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, p. 14-19.

Experiments demonstrate that crude commercial Li containing about 0.5% Na can be refined, the resulting metal containing as low as 0.001% Na. During the process, the metal is vaporized and condensed at a pressure of less than 0.04 micron. Operating data and experimental equipment. (C22, Li)

21-C. Some Aspects of Titanium Reduction Metallurgy. N. S. Spence. *Canadian Mining and Metallurgical Bulletin,* v. 44, Jan. 1951, p. 21-28; disc., p. 28; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, p. 20-27, disc., p. 27.

Reviews and correlates recent literature. 41 ref.
(C23, C26, C2, C4, Ti)

22-C. Factors Affecting the Reduction of Zinc Oxide by Carbon. D. W. Hopkins and A. G. Adlington. *Bulletin of the Institution of Mining and Metallurgy,* Jan. 1951; *Transactions,* v. 60, pt. 4, 1950-51, p. 101-116.

These factors were examined on a laboratory scale. Nut charcoal, carbon black, and electrode carbon, of particle size less than 5μ, were mixed with powdered ZnO and reacted at 980-1100° C. Rate of reduction of the oxide, and CO/CO_2 ratio in the retort atmosphere at various stages of reduction, were calculated. Kinetics of the process are analyzed. 20 ref. (C21, Zn)

23-C. A Study of the Reduction of Zinc Metaferrite by Carbon. D. W. Hopkins and A. G. Adlington. *Bulletin of the Institution of Mining and Metallurgy,* Jan. 1951; *Transactions,* v. 60, pt. 4, 1950-51, p. 117-128.

$ZnO \cdot Fe_2O_3$ was heated with carbon at 600-1050° C. for periods of 2 and 4 hr. In addition to continuous gas analysis, free ZnO, total ZnO, and metallic Fe were determined in the residue, and proportions of the various compounds present were calculated. Shows that the reduction takes place in four stages. A marked effect of the presence of oxides of iron was demonstrated. At the highest temperatures, Zn vapor generated by local reaction was partially reoxidized by CO_2-rich gas resulting from reduction of residual iron oxide. 11 ref. (C21, Zn)

24-C. A Contribution to the Metallurgy of the Parkes Process. (In German.) Friedrich Johannsen and Kurth-Heinz Lange-Eichholz. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Dec. 1950, p. 397-402.

Solubility of Ag and Zn in the area of the Pb-Ag-Zn diagram in which addition of Zn causes segregation of Ag was investigated. Solubility isotherms were established. Develops a formula for the consumption of Zn, and compares silver-recovery methods used in Germany and in the U. S. Includes constitution diagrams and tables.
(C21, M24, Zn, Ag)

25-C. Metallothermic and Certain Other Processes. (In Russian.) P. V. Gel'd and R. M. Lerinman. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Nov. 1950, p. 1191-1199.

Microscopic investigation of partially reacted briquets of Cr ore and Si showed that silicothermic reduction of oxides is accompanied by intermediate formation of SiO. Electron microscope study of the smokes formed during silicothermic

production of carbon-free ferrochromium and forromolybdenum indicates that they consist basically of spherical particles. Structural peculiarities of smokes obtained during aluminothermic reduction of Ti, melting of electrocorundum, and production of fused magnesite, and mechanisms of their formation. Includes electron micrographs.
(C26, Fe-n, Cr, Mo, Ti)

26-C. Electrolysis of Salts of Copper and Bismuth. (In Russian.) M. T. Kozlovskii and P. P. Tsyb. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Nov. 1950, p. 1208-1222.

Relationships of potential of the mercury cathode during electrodeposition of Cu and Bi, and of the anode during electrolytic dissociation of the amalgam obtained on concentration of metal in the amalgams at different current densities and temperatures, and on composition of the electrolyte and rate of intermixing of salts of Cu. Necessity of considering change of viscosity of the amalgam and related change of true surface area of mixed amalgams during mercury-electrode electrolysis. Possibility of quantitative recovery of Cu and Bi from their corresponding amalgams by anodic oxidation was established. 37 ref. (C29, L17, Cu, Bi)

27-C. Smelting Antimony in Yugoslavia. C. W. Jensen. *Mining Magazine*, v. 84, Jan. 1951, p. 20-22.

Modernization of the smelters.
(C21, Sb)

28-C. Electrothermic Production of Metallic Carbides. (In French.) *Journal du Four Electrique Industries Electrochimiques,* v. 59, Sept.-Oct. 1950, p. 121-122.

Factors influencing the process, such as purity of basic materials, grain-size distribution of charge, composition, pressure, and temperature. This study was made by use of micrographic, X-ray, and thermal methods and by analysis of equilibrium diagrams of the components.
(C21, M21, M23, C-n, W, Ti)

29-C. Large Furnaces for Electrolytic Production of Aluminum. (In French.) M. L. Ferrand. *Journal du Four Electrique et des Industries Electrochimiques,* v. 59, Sept.-Oct. 1950, p. 114-117; Nov.-Dec. 1950, p. 142-144.

New type of furnace which resulted in a decrease of electric current consumption from 18-20,000 to 15,000 kw-hr. per ton; and of labor from 45-50 to 25 manhours per ton.
(C23, Al)

30-C. In Metallurgy, the Accent is on New Metals, New Methods. A. W. Schlechten and H. R. Hanley. *Engineering and Mining Journal,* v. 152, Feb. 1951, p. 122-125, 183.

Reviews new developments in production of nonferrous metals, and in their applications.
(C general, T general, EG-a)

31-C. Continuous Cast Aluminum Bars Produced by the Properzi Process. D. I. Brown. *Iron Age,* v. 167, Feb. 15, 1951, p. 87-90; Feb. 22, 1951, p. 71-73.

Italian-made machine, which casts at a rate of 10-30 ft. per min., is simple in design and operation. Three men run the entire operation including the 15-stand continuous rolling mill which converts the cast section into coiled rod. It has been in use in this country since July 1950. Finished product has better than standard mechanical properties. Major use is for nails and manufactured wire products. (C5, Al)

32-C. The Dissociation of Beryllium Iodide in Platinum Containers. Bernard Kopelman and Harry Bender. *Journal of the Electrochemical Society,* v. 98, Mar. 1951, p. 89-93.

Equilibrium measurements were made in the range 575-1060° C. The measurements were only partly successful because of reaction of the vapor with the platinum. Dissociation constants and heat of dissociation of dimeric BeI_2 into its monomer were determined. The information was obtained to shed light on possible use of the iodide process for production of metallic Be. 11 ref. (C4, Be)

33-C. Influence of Vacuum Melting on the Properties of Ferrites Containing 25% Chromium. (In French.) J. Hochmann. *Bulletin du Cercle d'Etudes des Métaux,* v. 5, Sept.-Dec. 1949, p. 221-281.

A comprehensive review on the basis of the literature. Concludes that the method may be suitable for production, on a laboratory scale, of metals and alloys almost completely free of carbon, oxygen, and nitrogen. 46 ref. (C25, Fe-n)

34-C. Density of Fused Cryolite Electrolytic Baths for Aluminum Production. (In Italian.) A. Vajna. *Alluminio,* v. 19, No. 6, 1950, p. 541-547.

Methods for density determination indicating its importance for proper operation of the bath. Factors involved. (C23, Al)

35-C. Thermodynamic Analysis of Equilibrium Conditions During Reduction of Iron Chromite With Carbon. (In Russian.) P. V. Gel'd and O. A. Esin. *Zhurnal Prikladnoi Khimii* (Jour-

nal of Applied Chemistry), v. 23, Dec. 1950, p. 1260-1270.

Above reaction, which results in production of ferrochromium and CO, is of importance in the production of ferro-alloys. 18 ref. (C21, P12, Fe-n)

36-C. Kinetics of Reduction of Chromic Oxide and Iron Chromite. (In Russian.) P. V. Gel'd and O. A. Esin. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Dec. 1950, p. 1271-1276.

Reduction of chromic oxides with hydrogen and with carbon was experimentally investigated. Reduction with hydrogen was found to proceed much more slowly than with carbon. Increasing the fineness of graphite and chromite accelerates chromite reduction, which is also facilitated by additions of salts of alkali metals. 12 ref. (C21, Fe-n, Cr)

37-C. Mechanism of Oxidation of Cadmium Sulfide (In Russian.) D. M. Chizhikov, G. S. Frents, and B. Ya. Tratsevitskaya. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Dec. 1950, p. 1815-1826.

Experimental investigation showed that the primary oxidation product is $CdSO_4$, which may be reacted with the remaining CdS to give metallic Cd and SO_2. The latter products may also be formed by reaction of CdS and CdO. Conditions of temperature and pressure influencing both reactions were determined. Data and method of investigation. (C21, Cd)

38-C. El Paso Refinery of Phelps Dodge Refining Corporation. B. B. Kunkle. *Journal of Metals,* v. 3, Mar. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 229-234.

A general flowsheet and descriptions of plant layout, operations involved, and equipment used at one of the world's largest and most modern electrolytic Cu refineries. (C23, Cu)

39-C. Mechanism of Oxidation of Cadmium Sulfide. (In Russian.) D. M. Chizhikov, G. S. Frents, and B. Ya. Tratsevitskaya. *Izvestiva Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Dec. 1950, p. 1815-1826.

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40-C. (Book) World's Non-Ferrous Smelters and Refineries. Ed. 4. H. G. Cordero, editor. 318 pages. 1950. Quin Press, Ltd., London, England. 25s. (C21, A4, EG-a)

41-C. Ductile Zirconium. W. W. Stephens and J. H. McClain. *Chemical Engineering,* v. 58, Mar. 1951, p. 116-117.

New process and equipment for production by reduction of $ZrCl_4$ with molten Mg. Basic steps are zirconium carbide production, purification of crude chloride, salt removal, and sheet production. (C26, Zr)

42-C. Combined Ore Smelting and Scrap Reclamation Practice. C. C. Downie. *Mining Journal,* v. 236, Mar. 16, 1951, p. 248-249.

Procedures and benefits of combined operations for Cu, Pb, Zn, and Sb. (C21, A8, Cu, Pb, Zn, Sb)

43-C. German Developments: Reclaiming and Refining Light Metal Scrap. *Modern Metals,* v. 7, Mar. 1951, p. 54-55. (From "Fabrication of Aluminum in Germany," C. F. Nagel, Jr., B. C. McFadden, and G. D. Welty, Office for Military Government for Germany.)

Dry-hearth furnace. Flow chart for movement of Al and Mg scrap in the dual reclaiming and refining method described. Vacuum furnaces used are diagrammed. (C25, A8, Al, Mg)

44-C. Vacuum Treatment of Parkes' Process Crusts on a Pilot-Plant Scale. A. W. Schlechten and R. F. Doelling. *Journal of Metals,* v. 3, Apr. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, p. 327-330.

Crusts were vacuum distilled using a shortened Pidgeon retort. Zn was effectively removed below 800° C. and recovered as a sheet easily stripped from the furnace liner. Pb distillation required about 950° C. and the resulting condensate tended to stick to the thin metal liner. Final purity of the silver is limited only by presence of nonvolatile metals such as copper. (C22, Ag, Pb, Zn)

45-C. Factors Affecting the Reduction of Zinc Oxide by Carbon; A Study of the Reduction of Zinc Metaferrite by Carbon. *Bulletin of the Institution of Mining and Metallurgy,* Mar. 1951; *Transactions,* v. 60, pt. 6, 1950-51, p. 239-246.

Discussion of above papers by D. W. Hopkins and A. G. Adlington. (Jan. 1951 issue; item 22-C, 1951). (C21, Zn)

46-C. A Method for the Preparation of High-Purity Indium Metal. *Bulletin of the Institution of Mining and Metallurgy,* Mar. 1951; *Transactions,* v. 60, pt. 6, 1950-51, p. 246-248.

Discussion of above paper by T. A. A. Quarm. (Jan. 1951 issue; item 1-C, 1951.) (C4, In)

47-C. New Smelter Gives Titanium Industry a Lift. *Engineering and Mining Journal,* v. 152, Mar. 1951, p. 76-78.

Smelter at Sorel, Quebec. (C21, Ti)

48-C. Continuous Brass Casting Machine. *Metal Industry,* v. 78, Mar. 23, 1951, p. 226-227.

New British installation for production of brass billets. (C5, Cu)

49-C. Effect of Fluorides on an Al-Mg Alloy. (In German.) Wilhelm Dautzenberg. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Jan. 1951, p. 14-19.

Experiments made with CaF_2, NaF, and cryolite mixed with NaCl at 800, 900, and 1000° C. to determine their ability to react with Mg in an Al-Mg alloy containing 5.5% Mg, in order to refine scrap Al of similar composition. (C21, A8, Al)

50-C. Production of Zinc in Vertical Muffle Furnaces. (In German.) A. Roitzheim. *Metall,* v. 5, Feb. 1951, p. 63-67.

Reduction of ZnO in both horizontal and vertical muffles compared. Design and operation of a successful continuous vertical muffle furnace; suggestions for further improvements. (C21, Zn)

51-C. The Copper Reverberatory Furnace. W. H. Dennis. *Metallurgia,* v. 43, Mar. 1951, p. 107-111.

The increasing use of fine flotation concentrates in production of Cu has caused the reverberatory furnace to displace the blast furnace for smelting. Some of the factors affecting design, construction, and operation. (C21, Cu)

52-C. The Nature of Anions Discharged at the Anode During Electrolysis of Cryolite-Alumina Melts. (In Russian.) S. I. Rempel. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 76, Jan. 21, 1951, p. 411-414.

Results of experimental and theoretical investigations that are of importance in electrolytic production of metallic Al. (C23, Al)

53-C. Making Aluminium Alloys at the Works of International Alloys Ltd. *Edgar Allen News,* v. 29, Apr. 1951, p. 832-835.

Procedures and equipment of British firm. Raw materials include virgin Al, process scrap, old scrap, and dross. (C21, A8, Al)

54-C. Continuous Casting Practice in the Non-Ferrous Industries. R. Chadwick and J. F. Hobbs. *Journal of the Birmingham Metallurgical Society,* v. 31, Mar. 1951, p. 13-24.

A general discussion. Includes micrographs and macrographs showing Al and Cu alloys. (C5, Al, Cu)

55-C. Aspects of Continuous Casting. D. R. Wood. *Journal of the Birmingham Metallurgical Society,* v. 31, Mar. 1951, p. 25-30.

Detailed consideration of thermal equilibrium in the open-mold continuous casting process, and conditions under which various metals and alloys may be cast by such a method. (C5, D9)

56-C. Physicochemical Problems in the Thermal Production of Zinc and Their Importance to Metallurgical Practice. (In German.) Kurt Hoffmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Jan. 1951, p. 19-25; Mar. 1951, p. 104-109.

First part: thermal reduction of ZnO with CO and effect of an excess of CO and of inert gases on the reaction. Second and concluding part: practical possibilities of improving the output of horizontal muffle furnaces and advantages of briquetting the charge. 20 ref. (C21, Zn)

57-C. Dross Formation of Lead Melts in Calm Air. (In German.) W. Hofmann and K. H. Mahlich. *Werkstoffe und Korrosion,* v. 2, Feb. 1951, p. 55-68.

Experiments on effects of temperature, furnace atmosphere, and alloying additions on formation of dross from soft lead and its alloys. A new method of retarding this effect consists of heat treating the melt at 500-700° C. with frequent stirring. 25 ref. (C21, Pb)

58-C. Principles of the Equilibria Among Lead, Speiss, and Rock. (In German.) W. Lange. *Chemische Technik,* v. 3, Feb. 1951, p. 47-52.

Fundamental study of phase relationship among these materials, which are of importance in recovery of lead from arsenide ores. Numerous phase diagrams and tables. (C general, M24, Pb)

59-C. Electrolytic Tin Refining. C. W. Jensen. *Mining Magazine,* v. 84, Apr. 1951, p. 206-209.

Process involving use of Na_2S solution for refining crude tins containing as low as 70% Sn. (C23, Sn)

60-C. Refining Secondary Copper Alloys. Marvin Glassenberg, L. F. Mondolfo, and A. H. Hesse. *American Foundrymen's Society,* Preprint 51-65. Apr. 1951, 7 pages.

Experiments to determine rates of removal of common impurities from secondary Cu alloys by means of air injection, and to investigate effect of commercial O_2 on these rates of removal. (C21, A8, Cu)

61-C. Equilibria in the Dissociation of Be Iodide. Bernard Kopelman and Harry Bender. *U. S. Atomic Energy Commission,* AECU-1028, Apr. 5, 1951, 10 pages.

Experiments were performed to determine whether the large amounts of metal obtained by the cyclic iodide process, in which the iodide to be decomposed is thermodynamically stable with respect to decomposition into its elements, are due to upsetting of equilibrium only or can be explained by additional reactions. (C4, Be)

62-C. The Distillation of Ca and Mg. I. I. Betcherman and L. M. Pidgeon. *Canadian Mining and Metallurgical Bulletin,* v. 44, Apr. 1951, p. 253-263; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 166-177.

Vacuum distillation of Mg and Ca, their separation from each other, and their separation from less volatile impurities. 22 ref. (C22, Ca, Mg)

63-C. The Effect of Ultrasonic Frequencies on Electrolytic Processes. II. The Stirring Effect of Ultrasonics. (In German.) Albert Roll. *Zeitschrift für Metallkunde,* v. 41, Nov. 1950, p. 413-417.

Results of quantitative experimental study for electrolytic separation of Ag and of Cu. (C28, Cu, Ni)

64-C. Yellow Pine Antimony Smelter. *Mining World,* v. 13, May 1951, p. 30-34.

At Bradley Mining Co.'s new electric smelter at Yellow Pine, Idaho, a six-step process produces Sb_2O_3, and recovers Au, Ag, Cu, and Pb. Includes flowsheet. (C21, Sb, Au, Ag, Cu, Pb)

65-C. Remarks on the Article by K. Hoffman. "Physicochemical Problems in the Thermal Production of Zinc and Their Importance to Metallurgical Practice." (In German.) Hans Grothe. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Apr. 1951, p. 133-137.

Critically discusses above paper. (Jan. and Mar. 1951 issues, see item 56-C, 1951.) (C21, Zn)

66-C. Smelting Complex Lead Materials. C. C. Downe. *Mining Journal,* v. 236, May 11, 1951, p. 455-456.

Improved electrostatic system, which greatly reduces space requirements. Behavior of lead under different conditions, and separation of Pt metals from rich leads. (C21, Pb)

67-C. Active Intermediates in Chemical Reactions. Hydrogen Overvoltage-Crystal Growth. G. H. Turner. *Research,* v. 4, May 1951, p. 246-247.

Study of the effects of impurity elements in electrode and crystallization reactions has led to the conclusion that free radicals are present during many electrochemical reactions, and that they may profoundly affect consecutive major reactions. Investigations have been related to the activity of a number of minor elements in the electrolytic hydrogen and Zn processes. Lowering of current efficiency in the electrodeposition of Zn (electrolytic Zn process) due to such impurities as Ge and Sb is attributed to lowering of hydrogen overvoltage on a Zn surface caused by these impurities. (C23, Zn)

68-C. The Evaporation of Aluminum in Form of Aluminum Monofluoride. (In German.) Armin Schneider and Werner Schmidt. *Zeitschrift für Metallkunde,* v. 42, Feb. 1951, p. 43-54.

Conditions required to separate metallic Al from alloys of Cu, Si, and Fe+Mn by vaporizing the Al in form of AlF. Salt mixtures that can be used to fuse the Al powder into the regulus (impure bulk metal). Experiments on the development of salt mixtures for use in either of the two operations. 20 ref. (C28, Al)

69-C. Relationships Between Germanium and Cadmium in the Electrolysis of Zinc Sulphate Solutions. S. T. Ross and J. L. Bray. *Journal of Metals,* v. 3, June 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 465-467.

Electrometallurgical data on the problem of Ge removal from $ZnSO_4$ solutions. Confirmatory evidence of interaction between Ge and Cd is presented. Statistical analysis of the data is used to expand its significance and enhance its value. Further research is outlined. (C23, Zn)

70-C. Electric Furnace Melting of Copper at Baltimore. Peter R. Drummond. *Journal of Metals,* v. 3, June 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 468-472.

The furnace, the refractories, auxiliary equipment, operating procedure, and performance. Product is used to cast billets. (C21, Cu)

71-C. Surface Tension of a Molten Cryolite Bath. (In Italian.) A. Vajna. *Aluminio,* v. 20, No. 1, 1951, p. 29-38.

Results of measurements explain certain characteristic phenomena observed in electrolytic cells on

an industrial scale and apparently caused by surface tension of phases in contact, particularly at the anode. (C23, P10, Al)

72-C. Gases in Electrolytic Nickel. (In Russian.) E. Sh. Ioffe and A. L. Rotinyan. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Mar. 1, 1951, p. 91-92.

A theory of the process of inclusion of certain gases (H_2, O_2, CO, or CO_2) in electrolytic Ni is based on the assumption that a certain proportion of the gas content which can be determined by usual methods is present in the form of organic compounds of Ni, during electrolysis and always present in electrolyte. (C23, Ni)

73-C. Influence of Geometric Parameters of Electrolysis Apparatus on Distribution Within Them of Electrical Energy. (In Russian.) V. P. Mashovets, N. V. Pototskaya, N. L. Komarov, and U. F. Turomshina. *Zhurnal Prikladnoi Khimii* (Journal of Applied Physics), v. 24, Feb. 1951, p. 154-166.

Results of experimental investigation using a model to represent conditions in the cryolite bath for production of Al. The model was a single-electrode bath consisting of $CuSO_4 \cdot 5H_2O$, H_2SO_4, and alcohol. (C23, Al)

74-C. Improved Plant Design Marks New Utah Refinery. Stanley Hughes. *Engineering and Mining Journal*, v. 152, June 1951, p. 72-79.

Procedures and equipment of the West's newest electrolytic copper plant operated by Kennecott Copper Corp., Garfield, Utah. (C23, Cu)

75-C. Vacuum Melting Titanium and Zirconium. *Steel*, v. 128, June 18, 1951, p. 77-79. (Based on paper by A. C. Haskell, Jr.)

Research on production of Ti and Zr ingots is concentrated on use of a graphite crucible under vacuum or inert atmosphere, heated in a high-frequency induction furnace. (C25, Ti, Zr)

76-C. New Smelting Process Means More TiO_2 for Us. *Chemical Engineering*, v. 58, June 1951, p. 184, 186.

New Canadian process. Control of charge composition and furnace conditions so that little or no flux need be added gives a marketable melting iron and a Ti-rich slag suitable for acid digestion and leaching. (C21, D8, Ti, Fe)

77-C. Vacuum Fusion. *Metal Progress*, v. 59, June 1951, p. 852, 854, 856, 858, 860-862. Condensed from "The Influence of Vacuum Fusion Upon the Characteristics of Ferrite Containing 25% Chromium", J. Hochmann.

Previously abstracted from *Bulletin du Cercle d'Etudes des Métaux.* See item 33-C, 1951. (C25, Fe-n)

78-C. Theory of the Electrolytic Preparation of Aluminum. (In French.) E. Bonnier. *Bulletin de la Société Chimique de France*, Nov.-Dec. 1950, p. D131-D140.

Criticisms supported by experimental evidence. 51 ref. (C23, Al)

79-C. Influence of Iron and in Particular of Zinc Ferrites on the Reduction of Zinciferous Products. (In French.) E. Frenay. *Revue Universelle des Mines, de la Metallurgie des Travaux Publics, des Sciences et des Arts appliques a l'Industrie*, v. 94, Jan. 1951, p. 25-35.

Investigation using pure materials shows that in comparison to charges without Fe, extraction of Zn in the presence of Fe is slower during the first phase and faster during the second phase. Under certain conditions, final acceleration is accelerated more by the presence in the charge of Zn ferrites than by free ferric oxide. 10 ref. (C21, Zn)

80-C. Separation of Copper From Zinc by Ion Exchange. Ernest J. Breton, Jr., and A. W. Schlechten. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 517-521.

Ion exchange has been used for recovery of metals from waste waters. This fact suggested study of possibilities for use in metallurgical recovery processes. Experiments on the separation of Cu and Zn ions by selection action of ion-exchange resins showed the carboxylic type to be more effective than the sulfonic resins. The latter demonstrated a greater capacity over a wider pH range. Data show the effectiveness of resins as a means of concentration. (C28, A8, Cu, Zn)

81-C. Production of Aluminum-Silicon Alloys in the Electric Furnace. (In French.) Y. Dardel. *Journal du Four Electrique et des Industries Electrochimiques*, v. 60, Mar.-Apr. 1951, p. 37-39; May-June 1951, p. 68-70.

Process utilizing simultaneous reduction of Al_2O_3 and SiO_2; concentration limits and temperature conditions. 37 ref. (C21, Al)

82-C. Electrothermal Refining of Copper Concentrates in Italy. (In French.) M. C. Ferrante. *Journal du Four Electrique et des Industries Electrochimiques*, v. 60, May-June 1951, p. 71-72.

Includes flow diagrams for production of electrolytic Cu wires and bars, also precious metals from concentrates containing about 20% Cu. (C23, Cu, EG-c)

83-C. Cryoscopy in Fused Cryolite Ionization of Aluminum and Dissolved Oxides. (In French.) Maurice Rolin. *Revue de Métallurgie,* v. 48, Mar. 1951, p. 182-186; disc., p. 186.

Mechanism of Al production in the Héroult process. The Al is directly ionized and cryoscopic procedures were used for identification of the ions. (C21, Al)

84-C. Determination of Electrical Resistance of Alumina-Cryolite Solid Solutions as a Function of Temperature. (In Italian.) A. Vajna. *Alluminio,* v. 20, 1951, p. 147-149.

Results of a series of experiments applied to a study of current leakage in the solid crust which forms on the surface of commercial cells for production of Al. Inferences are drawn concerning the structure of alumina-cryolite solid solutions near the eutectic point. (C23, Al)

85-C. Look to New Ideas and New Processes Like These for Greater Production From Tomorrow's Smelters. *Engineering and Mining Journal,* v. 152, July 1951, p. 134-137.

Procedures and equipment, present status, and potentialities of use of ion-exchange resins, vacuum metallurgy, the inverted blast furnace (nonferrous), electromagnetic pumping of molten metals, flash smelting, and fluo-solids techniques. (C21)

86-C. What the Future Holds for Hydrometallurgy. N. Arbiter and H. H. Kellogg. *Engineering and Mining Journal,* v. 152, July 1951, p. 139-143.

Table shows how hydrometallurgy is being used for primary extraction of various nonferrous metals. Relative merits of hydrometallurgy and pyrometallurgy. 17 ref.
(C23, C24, EG-a)

87-C. The Preparation and Some Properties of Americium Metal. Edgar F. Westrum, Jr. and LeRoy Eyring. *Journal of the American Chemical Society,* v. 73, July 1951, p. 3396-3398.

AmF_3 prepared by hydrofluorination of the dioxide was reduced to metal on a 40-200 microgram scale by reduction with Ba metal in a high-vacuum micro-furnace at 1100° C. in various refractory materials. High yields of silvery, very malleable and ductile, metal globules were obtained. Density was determined as 11.7. Heat of solution of the metal in 1.5 molar aqueous HCl was also determined. 17 ref.
(C25, P10, P12, Am)

88-C. Nickel Alloys for Oxide-Coated Cathodes. A. M. Bounds and T. H. Briggs. *Proceedings of the I.R.E.,* v. 39, July 1951, p. 788-799.

Metallurgical problems and manufacturing methods used in refining and melting of Ni, and its fabrication into indirectly heated cathode sleeves for electron tubes. Role of minor constituent alloys from metallurgical and electronic points of view. Influences of each important element present in cathode Ni alloy. Suggestions concerning present and future developmental cathode material. (C21, T1, Ni)

89-C. Production of High Purity Calcium Metal by Thermal Reduction Method. III. Observation on the Mechanism of the Reaction. IV. Refining of Calcium Metal by Vacuum Distillation (In Japanese.) Eiichi Fujita. *Reports of the Government Chemical Industrial Research Institute, Tokyo,* v. 46, Feb. 1951, p. 75-94; Eng. abst., p. vi-vii.

Results of experimental investigation. Apparatus is diagrammed; data are charted and tabulated.
(C21, C25, Ca)

90-C. Solar-Furnace Experiments With Hydrogen on the Metallurgy of Chromium. (In French.) F. Trombe and M. Foex. *Revue de Métallurgie,* v. 48, May 1951, p. 359-362.

Use of H_2 to reduce Cr_2O_3 in solar furnace. Apparatus is diagrammed and illustrated. (C21, Cr)

91-C. Continuous Casting and Rolling Process Developed for Making Aluminum Rod. Frank P. Leahey and M. J. Fey. *Wire and Wire Products,* v. 26, July 1951, p. 581-582, 606-607.

Machinery, furnaces, and operations. (C5, F27, Al)

92-C. Secondary Aluminum Recovery in the South Pacific. H. W. Franz. *Journal of Metals,* v. 3, Aug. 1951, p. 597-599.

Aluminum from scrapped aircraft around the island of Biak was recovered by rather crude but effective methods. Techniques of furnace operation and chemical control.
(C21, A8, Al)

93-C. Arc Melting of Titanium Metal. S. F. Radtke, R. M. Scriver, and J. A. Snyder. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 620-624.

An automatic, continuous casting arc furnace employing a nonconsumable electrode and a d.c. arc was constructed and operated successfully for Ti. A comparison of the properties of arc and induction-melted Ti indicates that where high ductility, formability, and toughness are required, arc melted metal is preferable. 14 ref. (C21, Ti)

94-C. Production of Aluminum From Kalunite Alumina. Arthur Fleischer and Julian Glasser. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 634-636.

Investigation shows that the reduction of Kalunite alumina has produced commercially acceptable metal on a fairly large scale. (C23, Al)

95-C. The Composition of Some Lead Blast Furnace Slags From Port Pirie. A. B. Edwards. *Australasian Institute of Mining and Metallurgy, Proceedings,* new ser., Sept.-Dec. 1949, p. 41-67.

Results of a mineragraphic examination of representative samples of granulated lead blast-furnace slags from the Port Pirie Smelter, and of slowly cooled samples of the same slags. (C21, B21, Pb)

96-C. The Composition of Some Copper Slags From Port Kembla. A. B. Edwards. *Australasian Institute of Mining and Metallurgy, Proceedings,* new ser., Sept.-Dec. 1949, p. 69-84.

Samples were submitted for mineragraphic examination, with reference to mode of occurrence of Cu in them. The samples included blast-furnace slags, a forehearth accretion, and converter slags. (C21, B21, Cu)

97-C. The Composition of Some Copper Mattes. A. B. Edwards. *Australasian Institute of Mining and Metallurgy, Proceedings,* new ser., Sept.-Dec. 1949, p. 85-102.

Results of comprehensive study. (C21, Cu)

98-C. Electric Furnace Smelting and High Temperature Chemistry. Marvin J. Udy. *Canadian Chemical Processing,* v. 35, Aug. 1951, p. 626-629, 631.

Design of electric furnaces for different purposes, such as production of phosphorus, high-carbon ferrochromium, melting, refining, and selective reduction of metals. (C21, D5)

99-C. The Equilibrium Between Copper, Zinc, and Chlorine at 1,440° K. J. U. MacEwan and G. L. Christie. *Canadian Mining and Metallurgical Bulletin,* v. 44, Aug. 1951, p. 534-537; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 328-331.

Theory and laboratory experiments. A series of Cu-Zn alloys containing 0.3-10% Zn were made up into 180-g. ingots. These were exposed to chlorine at elevated temperatures. From a thermodynamic point of view, it is possible to remove Zn from brass by chlorine stripping down to a limiting value of 0.02% Zn at 1440° K. Application to brass refining is suggested. (C4, P12, Cu)

100-C. The Recovery of Gold from Manganiferous Ores From Wau, New Guinea. Interim Report No. 1. **Amalgamation and Cyanidation.** K. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Dept., University of Melbourne,* Investigation 378, June 30, 1950, 5 pages.

Amalgamation and cyanidation processes. Economic factors in choice between various methods. (C24, C29, Au, Mn)

101-C. Production of Magnesia From Sea Water and Dolomite. F. C. Gilbert and W. C. Gilpin. *Research,* v. 4, Aug. 1951, p. 348-353.

The process used at Hartlepool in the Ministry of Supply Works, operated by British Periclase Co. Ltd. Includes chemistry of the process, raw materials, and processing. (C22, Mg)

102-C. Preparation and Properties of Titanium-Chromium Binary Alloys. D. J. McPherson and M. G. Fontana. *Transactions of American Society for Metals,* v. 43, 1951, p. 1098-1125.

Previously abstracted from *American Society for Metals.* Preprint 40, 1950. See item 142-C, 1950. (C21, Q general, M21, Cr, Ti)

103-C. The Corrosion of Silver by Potassium Cyanide Solutions and Oxygen. (In English.) Vibeke Lund. *Acta Chemica Scandinavica,* v. 5, No. 4, 1951, p. 555-567.

Experimental study of mechanisms and kinetics of the reaction. It is of principal importance in recovery of Ag by cyanidation. (C24, R5, Ag)

104-C. On Some Researches in the Metallurgy of Tin. (In English.) Motoo Watanabe. *Japan Science Review,* v. 1, Dec. 1950, p. 67-74.

Work on smelting of tin concentrate. The original ore contains tungsten, which is extracted as calcium tungstate before smelting. The three steps studied were extraction of tungsten, reverberatory smelting, and vaporization of tin from slag. (C21, Sn)

105-C. The Role of Silicon in the Reduction of Zinciferous Charges. (In French.) E. Frenay. *Revue Universelle des Mines, de la Métallurgie des Travaux Publics, des Sciences et des Arts Appliques a l'Industrie,* v. 94, July 1951, p. 226-232.

Experiments show that addition of lime to the charge to be reduced diminishes considerably the bad effect due to presence of Si. Advantages and disadvantages of this procedure. (C21, Zn)

106-C. Observations on the Deoxidizing and Reducing Effect of Phosphorus-Copper in Metal Melts. (In German.) E. R. Thews. *Chemische Technik,* v. 3, May 1951, p. 151-153.

Shows that heat of metal melts greatly alters properties of oxides and reducing conditions and therefore invalidates explanations often advanced for supposed ineffectiveness of P-Cu as a reducing agent. Data are tabulated for a wide variety of metals, showing relative affinity for oxygen. (C21)

107-C. Processing of Zinc Dross. (In German.) G. Lorber. *Metall,* v. 5, July 1951, p. 291-292.

Recommended procedures for refining Zn dross, following magnetic separation of Fe from the raw material. Total Cl + Zn content is reduced to 2-4% by vaporization. (C22, A8, Zn)

108-C. Results of Experimental Work on Al-Cu-Mg Turnings Using Different Melting Methods and Annealing Processes. (In German.) August Buckelev. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, July 1951, p. 253-256.

Fusion of dry or moist turnings, with or without salt, or in presence of N_2, or after annealing at 400-550° C. Effect on the burning off of Al and Mg, as well as implications for sampling and for industry. (C21, A8, Al, Cu, Mg)

109-C. Reduction of Metal-Oxide Solid Solutions. (In Russian.) P. V. Gel'd, V. G. Valsov, and N. N. Serebrennikov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser., v. 78, June 1, 1951, p. 693-696.

Literature on fundamental mechanisms of the above is briefly reviewed. Kinetics of the reduction of Cr_2O_3 and of MnO by graphite in a vacuum and at atmospheric pressure were studied. 20 ref. (C25, D general, Cr, Mn)

110-C. Electric Furnace Smelting and High Temperature Chemistry. Marvin J. Udy. *Chemist,* v. 28, June, 1951, p. 238-243.

Previously abstracted from *Canadian Chemical Processing.* See item 98-C, 1951. (C21, D5)

111-C. Some Modern Developments in Copper Pyrometallurgy. W. B. Boggs. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 771-783; disc., p. 1047-1093. (C21, Cu)

112-C. The Zinc Smelting Industry in Great Britain. S. W. K. Morgan. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 784-808.

Growth of the industry, the sintering process, the distillation process, and production of high-purity zinc. (C21, Zn)

113-C. The Electrolytic Zinc Industry. Harry Hey. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 809-823; disc., p. 1047-1093.

Roasting; leaching and purification of solutions; electrolysis; melting and slab or ingot casting. (C23, C5, B15, Zn)

114-C. Continuous Casting of Oxygen-Free Copper Raises Production. D. I. Brown. *Iron Age,* v. 168, Aug. 30, 1951, p. 63-67.

Continuous-casting methods based on the technique and machines perfected by Continuous Metalcast Corp. of New York for nonferrous metals, Cu, brass, and Al. (C5, EG-a, Cu, Al)

115-C. Continuous Casting Revolutionizes the Brass Industry. D. I. Brown. *Iron Age,* v. 168, Sept. 6, 1951, p. 106-108.

Factors to be considered in continuous casting procedure. Equipment and procedures at Scovill Mfg. Co., Waterbury, Conn. (C5, Cu)

116-C. British Continuously Cast Large Aluminum Sections. D. I. Brown. *Iron Age,* v. 168, Sept. 13, 1951, p. 166-168.

How aluminum sections up to 9 in. in diameter and slabs up to 10 x 48 in. cross-section are now being continuously cast in Britain. Quality of the new product is superior to that made by conventional methods. (C5, Al)

117-C. Rotary Melting Furnaces. C. W. Jensen. *Mining Magazine,* v. 85, Aug. 1951, p. 73-75.

Advantages obtained by replacing reverberatory furnaces by rotating kilns in melting ingots, scrap, and in carrying out reduction processes. (C21)

118-C. Carbon, Oxygen, and Sulphur Content of Chilean Coppers as Related to Cuprous-Oxide Rectifiers. C. C. Hein and W. M. Hickam. *Journal of Applied Physics,* v. 22, Sept. 1951, p. 1192-1195.

Several Chilean coppers used in cuprous oxide rectifier work were analyzed for C, O_2, and S. The carbon determinations were in agreement with published solubility data. Large differences were found in the O_2 and S content which were correlated with refining data of the Cu and the reverse leakage currents of the rectifiers. The change in sulfur content caused by various heat treatment also was investigated. (C21, J general, Cu)

119-C. Formation of a Titanium Slag by Selective Fusion Reduction of Ilmenite. (In French.) André Chrétien and William Freudlich. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences,* v. 233, July 30, 1951, p. 413-415.

Almost complete separation of Ti and Fe can be effected in presence of C and Na_2CO_3 in suitable proportions, if temperature is strictly maintained between 1210 and 1340° C. (C21, Ti, Fe)

120-C. Strategic Tin Production Is Up to the Lone Star Smelter. *Engineering and Mining Journal,* Oct. 1951, p. 84-87.

The smelter treats lower grade ore than can be handled anywhere else in the world. (C21, Sn)

121-C. Small Scale Refining of Gold. L. L. Colin. *South African Mining and Engineering Journal,* v. 62, Sept. 1, 1951, p. 21-23.

Change in emphasis from large to small operations and advantages of the chlorine over the electrolytic process. (C4, C23, Au)

122-C. Semi-Pilot-Plant Investigations on Electrowinning Manganese From Chloride Electrolytes. J. H. Jacobs, P. E. Churchward, T. E. Hill, Jr., W. H. Curry, E. C. Perkins, and O. Q. Leone. *U. S. Bureau of Mines,* Report of Investigations 4817, Sept. 1951, 13 pages.

Results, advantages and disadvantages of the process. (C23, Mn)

123-C. A Continuous Casting Machine for Brass Billets. *Machinery Lloyd* (Overseas Ed.), v. 23, Sept. 29, 1951, p. 115-116.

A British Commercial installation. (C5, Cu)

124-C. Societa Metallurgica Italiana: Copper and Brass Production at Fornaci di Barga. *Metal Industry,* v. 79, Oct. 5, 1951, p. 279-282.

Facilities and procedures of Italian plant. Includes foundry practice, electrolytic refining, rolling, wire-drawing, bar and tube making. (C23, E general, F general, Cu)

125-C. Industria Nazionale Alluminio; Electrolytic Reduction of Aluminium. *Metal Industry,* v. 79, Oct. 5, 1951, p. 285-286.

Facilities of an Italian plant. (C23, Al)

126-C. Societa Alluminio per Azioni Veneto; Aluminium Production at Porto Marghera. *Metal Industry,* v. 79, Oct. 5, 1951, p. 287-288.

Facilities of an Italian plant. (C23, Al)

127-C. Societa Italiana del Piombo e dello Zinco; Lead and Zinc Production. *Metal Industry,* v. 79, Oct. 5, 1951, p. 297-298.

Facilities of Italian electrolytic plant. (C23, Pb, Zn)

128-C. Recovery of Gold From Amalgamation Residues From the Maude and Yellow Girl Mine, Glen Wills, Vic. *Commonwealth Scientific and Industrial Research Organization and the Mining Department, University of Melbourne,* Investigation 336, Feb. 8, 1951, 7 pages.

A comparison is made between recovery by straight amalgamation with no grinding and amalgamation using sodium plumbite. (C29, Au)

129-C. Zinc Smelting and Refining. *Journal of the American Zinc Institute,* v. 29, 1951, p. 51-70.

Round-table discussion of economic and technological status and trends. (C21, A4, Zn)

130-C. Electric Furnace Smelting and High Temperature Chemistry. Marvin J. Udy. *Journal of the Electrochemical Society,* v. 98, Nov. 1951, p. 158C-159C.

Previously abstracted from *Canadian Chemical Processing.* See item 110-C, 1951. (C21, D5)

131-C. Direct-Chill Casting of Aluminum Ingots. W. E. King. *Mechanical Engineering,* v. 73, Nov. 1951, p. 887-891.

Advantages and disadvantages of the above. Operation of the process and equipment used. (C5, Al)

132-C. The Distillation of Lithium Metal. Leo F. Epstein and W. H. Howland. *Science,* v. 114, Oct. 26, 1951, p. 443-444.

Use of glass system to purify Li on a laboratory scale. (C22, Li)

133-C. Aluminum Ingots. (In German.) B. Keysselitz. *Metall,* v. 5, Oct. 1951, p. 442-444.

Melting scrap aluminum and the compositions, properties, and specific uses of different Al alloys. (C21, A8, Al)

134-C. Experiments With Sintered Dolomite and Tar as Well as With Acid Tamping Clay as Furnace Linings for Smelting Copper in the Inclined Short Rotary Furnace (Ellipsoidal Furnace) **Fired With City Gas.** (In German.) Paul Klare. *Zeitschrift für Erzbergbau und Metallhuttenwesen,* v. 4, Sept. 1951, p. 338-340.

Results of comparative study with basic and acid furnace linings. (C21, Cu)

135-C. Physicochemical Problems in Thermal Production of Zinc and Their Practical Significance. (In German.) Kurt Hoffmann. *Zeitschrift für Erzbergbau und Metallhuttenwesen,* v. 4, Sept. 1951, p. 344-349.

Discusses Grothe's recent article in *Erzmetall,* v. 4, 1951. (See also item 65-C, 1951.) Disagrees with Grothe's theory of the mechanism of reduction of ZnO by carbon and CO, also with the idea that briquetting the charge promotes the reaction. 15 ref. (C21, Zn)

136-C. Japanese Plan to Produce Titanium. *Engineering and Mining Journal,* v. 152, Nov. 1951, p. 104.

Proposed flowsheet, using Japanese iron-sand deposits. Steps are: electric-furnace reduction, yielding Ti slag and pig iron; briquetting and sintering; chlorination; purification and distillation; Ti reduction with Mg; and vacuum distillation. (C26, C25, B16, B17, Ti)

137-C. (Book) **Die Metallurgie des Zinks.** (The Metallurgy of Zinc.) F. M. Loskutow. 296 pages. 1950. Verlag Wilhelm Knapp, Halle (Saale), Germany. (Translated from Russian to German by Fr. Krantz.)

The various methods of extracting Zn from its ores and refining it. Equipment and furnaces required in the extraction and processing of zinc; tables and graphs present results obtained by Soviet metallurgists. (C21, B general, Zn)

SECTION D

FERROUS REDUCTION and REFINING

1-D. Interest in Continuous Steel Casting Gains Momentum. *Steel,* v. 127, Dec. 25, 1950, p. 68, 70, 72.

Developments reported at 8th Electric Furnace Committee, AIME, Conference, Pittsburgh, Dec. 7-9, 1950. (D9, ST)

2-D. Oxygen for Steel Refining. G. Husson. *Metal Progress,* v. 58, Dec. 1950, p. 868.

Investigations during the past 3 years by IRSID (the French Cooperative Institute for Steel Research) on the use of enriched air in steel metallurgy and its prospects of future success.
(D general, B22, ST)

3-D. Babcock & Wilcox Tube Company Develops Continuous Casting. Isaac Harter, Jr. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 57-62.

Experimental work being done on the process. (D9, ST)

4-D. Trends in Electric Arc Furnace Practice. Donald L. Clark and James A. Clark. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 103-110.

15 references. (D5, ST)

5-D. Treatment of Brick to Prevent CO Disinfegration. James A. Shea. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 116-119.

See abstract of "How to Prevent Blast Furnace Lining Disintegration", *Steel,* item 318-D, 1950. (D1)

6-D. Means of Modification of Gas Composition in the Blast-Furnace Throat and Their Influence on Utilization of Heat in the Blast Furnace. (In French.) Paul Thierry and Jean Szczeniowski. *Revue de Métallurgie,* v. 47, Oct. 1950, 739-759.

Reactions affecting efficiency of operation, methods of improving operating efficiency, and thermal effect of improving operating efficiency. Practical recommendations are given on the basis of the results. (D1, Fe)

7-D. An Extension in the Use of Rammed Silica Refractory Linings. (In Italian.) Antonio Scortecci, Aurelio Palazzi, and Francesco Savioli. *Metallurgia Italiana,* v. 42, Aug.-Sept. 1950, p. 297-298.

Application of a rammed quartzite lining in the uptake of a 50-ton openhearth furnace. (D2, ST)

8-D. Contribution to the Study of Wear of Ladle Nozzles. (In Italian.) Sergio Descovich and Francesco Savioli. *Metallurgia Italiana,* v. 42, Aug.-Sept. 1950, p. 309-311.

Theoretical analysis of the widening of nozzles during pouring of molten steel. Develops equation for the frictions of a fluid stream in contact with a highly viscous liquid varying with distance from the contact surface. The latter is essentially the state of the refractory nozzle walls during pouring. Theory is confirmed by experiment. (D9, ST)

9-D. Evaluation of the Bessemer Process in Small Converters. (In Italian.) Erich Lanzendorfer. *Metallurgia Italiana,* v. 42, Aug.-Sept. 1950, p. 312-320.

Previously abstracted from German version in *Neue Giesserei.* See item 141-D, 1950. (D3, ST)

10-D. Continuous Casting Featured at Electric Furnace Meeting. *Iron Age,* v. 166, Dec. 28, 1950, p. 66-67.

Summarizes proceedings of 8th Annual Electric Furnace Steel Conference, Pittsburgh, Dec. 7-9, 1950. (D9, ST)

11-D. Better Sulphur Elimination in Basic Open Hearth Melting. J. G. Rivet. *American Foundryman,* v. 18, Dec. 1950, p. 61-63.

Investigation to determine the cause and remedy for an increased scrap loss due to hot tears and cracks. It was decided that high sulfur content of the steel was probably responsible. Development of a satisfactory procedure for re-

ducing the S content to below 0.03%, which remedied the trouble. (D2, ST)

12-D. Description of the Blast Furnace Controlled Split-Wind Blowing Installation at Algoma Steel Corp., Ltd. William O. Bishop. *Blast Furnace and Steel Plant,* v. 38, Dec. 1950, p. 1428-1434.

Split-wind blowing is defined as the delivering of wind simultaneously to two or more furnaces from a common main supplied by one or more units of blowing equipment. (D1, ST)

13-D. Improvements in Electric Furnace Design. F. V. Lewis. *Foundry Trade Journal,* v. 89, Dec. 14, 1950, p. 505-506.

Model TS Birlec Lectromelt steelmelting furnace, with rotary controller. Advantages of the latter, which was substituted for the original contactor-type controller. (D5, ST)

14-D. Iron; Deoxidation by Aluminium. H. A. Sloman and E. L. Evans. *Iron and Steel,* Nov. 28, 1950, p. 433-436; disc., p. 466-470.

See abstract of "Studies in the Deoxidation of Iron; Deoxidation by Aluminium," *Journal of the Iron and Steel Institute,* item 166-D, 1950. (D general, Fe, ST)

15-D. Sulphur; Thermodynamic Aspects of Its Movement Between Gas and Slag. F. D. Richardson and G. Withers. *Iron and Steel,* Nov. 28, 1950, p. 436-438; disc., p. 470-471.

See abstract of "Thermodynamic Aspects of the Movement of Sulphur Between Gas and Slag in the Basic Open-Hearth Process," *Journal of the Iron and Steel Institute,* item 165-D, 1950. (D2, B21, P12, ST)

16-D. Methods of Improving Basic Bessemer Steel. (In German.) *Stahl und Eisen,* v. 70, Nov. 9, 1950, p. 1077-1079.

Three laboratory experiments and one large-scale experiment made to find ways of reducing the P and N contents of the finished steel. By use of an oxygen-enriched blast, they have been reduced to 0.03 and 0.003%, respectively. (D3, ST)

17-D. Contributions to the Chemistry of Steelmaking During the Year 1949. (In German.) Paul Klinger. *Stahl und Eisen,* v. 70, Sept. 28, 1950, p. 891-894; Oct. 12, 1950, p. 944-947; Nov. 9, 1950, p. 1080-1083.

A review. 104 ref. (D general, ST)

18-D. Bases for Calculation and Selection of Charge for Basic Open-hearth Furnaces in Production of Ordinary Steel. (In Portuguese.) Piotr Krynicki. *Boletim da Associacao Brasileira de Metais,* v. 6, July 1950, p. 241-253.

Theoretical principles and mechanism of the openhearth process. (D2, ST)

19-D. Several Special Refining Processes and Their Application in Brazil. (In Portuguese.) Roberto Lanari. *Boletim de Associacao Brasileira de Metais,* v. 6, July 1950, p. 254-272.

Modern methods of steelmaking critically analyzed from the point of view of their applicability in Brazil. 16 ref. (D general, ST)

20-D. Internal Stress Due to Cooling of the Cylindrical Steel Ingots. II. (In English.) Tokutaro Hirone and Noboru Tsuya. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Aug. 1949, p. 111-113.

Theoretical investigation of stresses in cylindrical ingots, having a small axial hole and cooled from the outside only. (D9, Q25, ST)

21-D. Germans Make Pig Iron Without Coking Coal. B. M. Pearson. *Iron Age,* v. 167, Jan. 11, 1951, p. 71-72.

Humboldt distillation process by which pig iron is produced in a low-shaft blast furnace. Ore fines and a noncoking coal are used in the form of briquettes. Noncoking coals rich in gas and tar are most suitable. The new furnace is only one-third the size of conventional blast furnaces, yet tonnages of iron from the two types are equal. (D1, Fe)

22-D. The Design of a New Open Hearth Shop. I. H. E. Warren, Jr. *Industrial Heating,* v. 17, Dec. 1950, p. 2160, 2162, 2164, 2166, 2241-2242.

Suggestions as to the facilities necessary for efficient production in any proposed new openhearth plant. Problems involved in the selection of the final layout and the auxiliary equipment. (D2, ST)

23-D. Pilot-Plant Smelting of Ilmenite in the Electric Furnace. C. Kerby Stoddard, Sandford S. Cole, L. T. Eck, and C. W. Davis. *U. S. Bureau of Mines,* Report of Investigations 4750, Dec. 1950, 15 pages.

A large-scale test on the removal of iron from ilmenite ore. Approximately 15 tons of slag containing 65-67% TiO_2 was produced from an ore containing about 30-45% TiO_2, producing a material suitable for TiO_2 pigment. The iron content was obtained as a pig iron of better potential market and strategic value. (D8, C21, Fe, Ti)

24-D. Alloy Steel Production in Large Basic Furnaces. A. K. Blough. *Journal of Metals,* v. 191, Jan. 1951, p. 30-32.

At Canton Steel Div., Republic Steel Corp., Canton, Ohio. (D5, AY)

25-D. Solution Loss and Reducing Power of Blast Furnace Gas. T. L. Joseph. *Journal of Metals,* v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 37-43.

A study was made of the amount of solution loss necessary to maintain the reducing power of the gas stream in the blast furnace. Curves show the effect of solution loss, moisture in the blast, and CO_2 from the flux on the N_2 in the top gas. (D1, Fe)

26-D. Kinetic Study of the Reduction of Ferrous Oxide by Hydrogen. (In French.) Jacques Bénard and Jean Moreau. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Oct. 30, 1950, p. 904-906.

Mechanism of the reaction was investigated at several constant temperatures between 450 and 700° C. Method of investigation and results. (D general, P12, Fe)

27-D. The Effect of Carbon Content on the Desulfurizing of Iron Melts by a Lime-Fluorspar Crucible in a High-Frequency Furnace. (In German.) Wilhelm Anton Fischer and Theodor Cohnen. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 355-365; disc., p. 365-366.

Desulfurizing experiments with iron melts of different carbon contents ranging from about 0.10 to 3% showed that excellent results could be obtained when 15-20% fluorspar was added to the lime of which the crucible was made. Sulfur contents rapidly decreased with increasing carbon content. Results with lime and carborundum crucibles were less desirable. 16 ref. (D6, Fe)

28-D. Specifications for Open Hearth Charge Oxides. *American Iron and Steel Institute,* Contributions to the Metallurgy of Steel, no. 36, Aug. 1950, 29 pages.

The specifications are based on completed questionnaires covering performance and properties. Questionnaires were answered on the basis of actual experience. (D2, S22, ST)

29-D. Progress in Electric Steelmaking. Sidney W. Poole. *Metal Progress,* v. 59, Jan. 1951, p. 93, 102, 104, 106, 108, 110, 112.

Reviews proceedings of AIME's Electric Furnace Steel Conference, Pittsburgh, Dec. 1950. (D5, ST)

30-D. Electrothermics and Electrothermal Processes; Castner Memorial Lecture. Christian H. Aall. *Chemistry & Industry,* Dec. 30, 1950, p. 830-840.

History, direct vs. alternating current, single-phase vs. 3-phase power, power factor, electrode configuration, electrodes, covered furnaces, rotating furnaces, furnace operation, and furnace construction. Some specific electric-furnace processes, including manufacture of CaC_2 and $CaCN_2$, of ferro-alloys, of phosphorus, and of electric pig iron. (D5, D8, Fe)

31-D. Mineral and Chemical Changes in Periclase Brick Under Conditions of Steel Plant Operation. R. G. Wells and L. H. Van Vlack. *Journal of the American Ceramic Society,* v. 34, Feb. 1951, p. 64-70.

Definite zones were developed by periclase refractories during service in openhearth furnaces. These zones represent a concentration gradient through the brick that results from the thermal gradient across the brick and from absorption of material from the furnace atmosphere. 16 ref. (D2, ST)

32-D. Temperatures of Openhearth Bottoms Measured. Roland B. Snow. *Iron Age,* v. 167, Feb. 1, 1951, p. 103-106; Feb. 8, 1951, p. 98-100.

Rammed bottoms of the same depth were found to show similar thermal gradients providing equal insulation is used. Drill-core data show that all bottoms eroded to about the same depth after limited service regardless of composition or burning-in schedule. As a result of the experiments, better design, materials, and methods are recommended. (D2, ST)

33-D. Horizontal Continuous Casting Machine. *Iron and Steel Engineer,* v. 28, Jan. 1951, p. 144, 147.

New development in continuous casting of steel, recently patented by J. F. Jacquet, technical secretary of the Belgian Blast Furnace and Steel Works Association. Several advantages are claimed. (D9, ST)

34-D. New Refractory Hung Arch Reduces Furnace Failures. *Journal of Metals,* v. 191, Feb. 1951, p. 96.

Design suitable for arches of openhearth, soaking-pit, and many other types of steel mill furnaces. (D2, F21, ST)

35-D. Electric Furnace Roof Refractories. T. A. Blackwell. *Journal of Metals,* v. 191, Feb. 1951, p. 100.

Experiences of Atlas Steels, Ltd., Welland, Ont., in connection with various materials and structural designs. (D5)

36-D. Observations on Rimming Steel Ingots. A. Hultgren, G. Phragmen, S. Wohlfahrt, and J. E. Ostberg. *Journal of Metals,* v. 191, Feb. 1951, *Trans-*

actions of the American Institute of Mining and Metallurgical Engineers, v. 191, 1951, p. 101-110.

Detailed study of a number of rimming ingots, both low and high carbon, and especially of effects of superimposed air pressure. Requirement to suppress core bubbles is between 10 and 15 atm. at 6.5 atm.; freezing was in semikilled manner; and, at 3 atm., steel was of rising type. Probable mechanism of freezing under various conditions. (D9, ST)

37-D. Carbon Block Proposed for Open-Hearth Bottoms. *Steel,* v. 128, Feb. 12, 1951, p. 82, 84.

Subhearth lining of machined carbon blocks affords extra protection against furnace breakouts. Original installation savings range from $3000 to $5000. (D2, ST)

38-D. Trends in Steel Plant Controls for Quality. H. J. Forsyth. *Blast Furnace and Steel Plant,* v. 39, Jan. 1951, p. 69-73, 77.

Quality control in blast furnaces, bessemer convertors, the openhearth. Spectroscopy, conservation of manganese, oxidation loss, and blooming and finishing mills. (D general, F23, S12, Fe, ST)

39-D. Increase of Ingot Mold Life Versus Surface Quality of Billets. Louis A. Boldizar. *Blast Furnace and Steel Plant,* v. 39, Jan. 1951, p. 74-77

In an effort to achieve both increased ingot mold life and improved surface quality of billets, the following problems were studied in plant practice: cutting or washing out of plug area of ingot mold; refractory material embedded in the surface of billets rolled directly from reheated ingots; and billet defects due to metal splash during initial pouring. Use of plywood discs in the bottoms of the molds practically doubled mold life and improved billet surface quality. (D9, ST)

40-D. Ionic Theory of Slag-Metal Equilibria. Part II. Applications to the Basic Openhearth Process. P. Herasymenko and G. E. Speight. *Journal of the Iron and Steel Institute,* v. 166, Dec. 1950, p. 289-303.

The relationships between total number of ions, or ionic fraction of oxygen ions and sum of the acids can be represented by empirical curves. Using these relationships, equilibrium ratios derived in Part I can be expressed as nomograms for calculation of O_2 content of liquid steel and of desulfurization ratio from slag analysis. Oxygen content of the basic steel is a function of FeO content of FeO and of sum of the acids. Analytically determined O_2 contents agree, within limits of experimental error, with O_2 contents calculated from slag analysis and corrected for effect of temperature and of carbon. The equilibrium between the trivalent and bivalent Fe in slag and liquid steel was examined empirically. Effects of small amounts of fluoride in the basic slag were also investigated. 30 ref. (D2, ST)

41-D. Joint Discussion on the Papers. "Distribution of Materials in the Blast-Furnace. Part II. Compensated Charging," by H. L. Saunders and R. Wild; **"Investigations on an Experimental Blast-Furnace",** by H. L. Saunders, G. B. Butler, and J. M. Tweedy; and **"A Radio-Active Technique for Determining Gas Transit Times in a Driving Blast-Furnace",** by E. W. Voice. *Journal of the Iron and Steel Institute,* v. 166, Dec. 1950, p. 315-318.

Covers above papers published in the Sept., Oct., and Nov. 1949 issues, respectively (see items 2B-260, 2B-284 and 2B-319, 1949). Includes authors' replies. (D1, Fe)

42-D. Discussion on the Paper: "The Effect of Sodium Oxide Additions to Steelmaking Slags. Part I. Use of Soda to Dephosphorize Pig Iron at 1400° C.," by W. R. Maddocks and E. T. Turkdogan. *Journal of the Iron and Steel Institute,* v. 166, Dec. 1950, p. 320-322.

Covers above paper published in July 1949 issue (see item 2B-283, 1949). Includes authors' reply. (D2, B21, ST)

43-D. Distribution of Materials in the Blast-Furnace, Part III. Further Factors Influencing the Distribution of Solids in the Blast-Furnace. R. Wild. *Journal of the Iron and Steel Institute,* v. 166, Dec. 1950, p. 339-348.

Previous studies were extended to further consideration of effects of modifications in design and operation of the head-gear and nature of the materials charged. (D1, Fe)

44-D. O. H. Furnace Pressures; Reduction of Errors in Measurement Due to Buoyancy. J. Chapman and G. Lomas. *Iron and Steel,* v. 24, Jan. 1951, p. 3-6.

Control of furnace pressure is used in order to reduce air infiltration. Usually a recording instrument is connected by means of a pipeline to a piece of pipe inserted in the crown of the furnace. A systematic study of errors and their variation as a result of different factors was made. Use of a water-cooled front-wall leg plus a short crown leg reduced buoyancy errors from as much as 0.1 in. H_2O to about 0.01 in. H_2O. (D2, S18, ST)

45-D. The Conversion of Pig Iron Into Steel in the Converter Using Pure Oxygen. (In German.) Heinrich Hellbrugge. *Stahl und Eisen,* v. 70, Dec. 21, 1950, p. 1208-1211.

Procedure which proves the practicability of converting pig iron into steel by use of very pure oxygen. (D3, ST)

46-D. Model Experiments on the Flow of Hot Gas in Openhearth Furnaces. (In German.) Fritz Schultz-Grunow. *Stahl und Eisen,* v. 70, Dec. 21, 1950, p. 1211-1213.

A study using water or air, which made it possible to increase efficiency of the furnace by slightly altering its design and to explain differences in output of identical furnaces. Photographs show flow patterns. (D2, ST)

47-D. Flow Conditions in Openhearth Furnaces Indicated by British Model Experiments. (In German.) Michael Hansen. *Stahl und Eisen,* v. 70, Dec. 21, 1950, p. 1213-1219.

Critical discussion of three British reports on work done in glass models using water and Al powder. Numerous diagrams and photographic flow patterns. Indicates good agreement with former German work and with plant observations. Possibilities of improved design. (D2, ST)

48-D. Use of Oxygen in the Electric Arc Furnace. (In German.) Max Hauck and Harro Werwach. *Stahl und Eisen,* v. 71, Jan. 4, 1951, p. 15-18.

More than 100 experiments were made to determine whether use of O_2 would result in improvement of quality or economic advantages. Results were satisfactory in both respects. (D5, B22, ST)

49-D. Use of Pure Oxygen in the Refining of Stainless Chromium-Nickel Steels. (In German.) Friedrich Illian. *Stahl und Eisen,* v. 71, Jan. 4, 1951, p. 18-19.

Experiments show that this method of melting Cr-Ni scrap is successful in reducing carbon content to 0.05% without reducing the Ni content, and in reducing the consumption of electrode material and of electric power. Data are graphed and tabulated. (D5, B22, SS)

50-D. Effect of Design and Size of Ingot Moulds on Their Life. (In Polish.) K. Radzwicki. *Prace Badawcze Glownego Instytutu Metallurgii i Odlewnictwa,* v. 2, No. 4, 1950, p. 285-308.

Effect of individual design factors on life of ingot molds and on the steel solidification process. Design and life of ingot molds used in Polish steel plants, and some recommendations for their standardization and redesign. (D9, ST)

51-D. Slag and Removal of Elements in the Basic Openhearth Process. Analysis Based on Statistical Methods. Part II. Phosphorus. (In Polish.) E. Bucko. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, No. 4, 1950, p. 309-325.

Influence of individual factors on removal of P and on its rate is considered on the basis of statistical analysis. Relation between P_2O_5-P ratio, phosphorus content of the bath, and slag basicity. The influence of total Fe content of slag on P removal. (D2, ST)

52-D. Blast Furnace Linings Made From Granular Carbon. (In Spanish.) Francisco Millan de Val. *Instituto del Hierro y del Acero,* v. 3, July-Sept. 1950, p. 210-222.

Experiences in a Spanish plant using carbon blast furnace linings instead of aluminosilicate refractories. Details of furnace construction. (To be continued.) 12 ref. (D1, Fe)

53-D. The Physical Chemistry of Steelmaking. Part I. Karl L. Fetters. *Industrial Heating,* v. 18, Jan. 1951, p. 74, 76, 78, 80.

Advances made in slag-metal and physical-chemistry research in the last 20 years. (To be continued.) (D general, ST)

54-D. The Design of a New Open Hearth Shop. II. H. E. Warren, Jr. *Industrial Heating,* v. 18, Jan. 1951, p. 82, 84, 86, 88.

Materials used in construction; general plant layout for efficient materials flow; and auxiliary equipment. (To be continued.) (D2, ST)

55-D. Refractory Practice in Acid Electric Steel Melting. R. H. Jacoby and M. Petty. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 359-363; disc., p. 363-364.

Previously abstracted from *American Foundryman.* See item 93-D, 1950. (D5, ST)

56-D. Manganese Recovery in Acid Electric Steelmaking. Sam F. Carter. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 471-490; disc., p. 490-491.

Previously abstracted from preprint. See item 151-D, 1950. (D5, ST)

57-D. Effect of Hot Metal on Openhearth Production. William A. Greene. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 13-23.

Previously abstracted from *Blast Furnace and Steel Plant.* See item 114-D, 1950. (D2, ST)

58-D. Factors Affecting Surface Quality of Plain Carbon, Fully Killed, Open-Hearth Steels. R. L. Roshong and G. P. Michalos. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 25-33.

Variations in melting and pouring practices as they affect surface quality. (D2, D9, CN)

59-D. Use of Oxygen Jets Through the Back Wall. A. E. Reinhard. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 43-48; disc., p. 48-51.

Previously abstracted from *Journal of Metals.* See item 182-D, 1950. (D2, B22, ST)

60-D. Progress Report on the Use of Metallurgical Oxygen. P. W. Nutting. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 51-59; disc., p. 59-61.

Use for decarbonizing and its decreasing use for flame enrichment. Damage to furnace refractories. (D2, B22, ST)

61-D. Faster Charging Practice. Vernon W. Jones. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 62-65; disc., p. 65-68.

Armco Steel Corp. shop is being designed so that there can be no interference caused by two adjacent furnaces charging at the same time. (D2, ST)

62-D. One Method of Handling Stool Stickers. Roger Wolcott. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 68-70; disc., p. 70.

Practice at Jones and Laughlin Steel Corp., with particular reference to experience with carbon inserts. Methods of preventing stool stickers, and methods employed when preventive measures fail. (D2, ST)

63-D. A Few Factors Affecting Stool Stickers. C. G. McCabe. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 71-73; disc., p. 73-74.

Composite stool used by the Wheeling Steel Corp. for low-carbon steel production. Performance. (D2, CN)

64-D. New Mold Coatings. Harold J. Walker. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 75-76; disc., p. 76-77.

A tar ingot-mold coating used by Republic Steel Corp. consists of a tar pit heated by a steam line, a table to support a mold, and a 20-hp. motor to circulate the tar. Advantages and disadvantages of other coating materials tested in the search for a substitute for tar. (D9)

65-D. New Mold Coatings. J. J. Golden. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 77-80; disc., p. 80-81.

Testing program at the Gary plant of Carnegie-Illinois Steel Corp., to evaluate several ingot mold coating materials, to obtain a mold coating that does not give off fumes and that approaches tar in performance and cost. (D2)

66-D. A Method of Nozzle Setting. W. G. McDonough. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 81-83; disc., p. 83-87.

Method used at National Works, National Tube Co., on both 60-ton bessemer ladles and 185-ton open-hearth ladles. (D9)

67-D. Changes in Roof Design and Elevation and Their Effect on Roof Life. R. P. Carpenter. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 87-88; disc., p. 88-89.

Design used by Republic Steel Corp,. Cleveland, for satisfactorily cooling a skew channel. (D2)

68-D. Charging Practice and Its Effect on Production. William Schwinn. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 101-102; disc., p. 102.

Previously abstracted from *Journal of Metals.* See item 235-D, 1950. (D2, ST)

69-D. Cupola Practice at the Stanley Works. R. L. Baldwin. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 108-110; disc., p. 110-111.

Cupola installation for supplying hot metal of uniform analysis to openhearth furnaces. Charging practice, desulfurizing practice, and cupola performance. (D2, ST)

70-D. Oxygen for Carbon Reduction and Temperature Pickup. E. H. Reyer. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 111-113; disc., p. 113-114.

Previously abstracted from *Journal of Metals.* See item 221-D, 1950. (D2, B22, ST)

71-D. Oxygen in Liquid Open-Hearth Steel—Oxidation During Tapping and Ladle Filling. T. E. Brower, J. W. Bain, and B. M. Larsen. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 161-180; disc., p. 180-183.

Previously abstracted from *Journal of Metals.* See item 183-D, 1950. (D2, D9, ST)

72-D. Conservation of Manganese. Shadburn Marshall. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 186-188.

Advantages and disadvantages of several methods of Mn conservation including materials for charge and additions of Mn-containing ferroalloys to furnace or ladle. (D2, B22, ST, Mn)

73-D. The All-Basic Open Hearth, European and American. R. P. Heuer and M. A. Fay. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 189-212; disc., p. 213-216.

Previously abstracted from *Journal of Metals.* See item 188-D, 1950. (D2, ST)

74-D. Progress Report on All-Basic Furnace at South Works, Carnegie-Illinois Steel Corporation. M. F. Yarotsky. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 217-218.

Stability of basic construction, production rates, delays, fuel utilization, and over-all economy of the all-basic design as compared to conventional silica furnaces. (D2, ST)

75-D. Progress Report on All-Basic Furnace at Steel Company of Canada. A. K. Moore. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 219-220.

Data on productive and cost differentials between the all-basic furnace and comparative furnaces with silica main roofs. Compares it with similar data reported in 1949. (D2, ST)

76-D. Comparison of Burned and Unburned Brick in Basic Ends. R. C. Solomon. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 222; disc., p. 222-223.

Data collected by Granite City Steel Co., Granite City, Ill. (D2, ST)

77-D. Sillimanite Brick in Linings of Hot-Metal Mixers. F. A. Colledge. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 224-231; disc., p. 231-238.

Experiences of Carnegie-Illinois Steel Corp., Munhall, Pa. (D2, ST)

78-D. A Method of Estimating Thickness of Hot-Metal Mixer Linings. L. L. Wells, Jr. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 238-241.

Method used at South Works, Carnegie-Illinois Steel Corp., Chicago. Precautions necessary. (D2, ST)

79-D. Performance of High-Magnesia Ramming Mixes. Rudolph Smith. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 242-244; disc., p. 244.

Previously abstracted from *Journal of Metals.* See item 149-D, 1950. (D2, ST)

80-D. Clay-Graphite Brick for Lining Open-Hearth Ladles. Ernest B. Snyder. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 244-247.

Tests made in the openhearth shop of Wheeling Steel Corp., Steubenville, Ohio. (D2, ST)

81-D. Flow and Velocities of Air and Waste Gases. H. V. Flagg. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 253-259; disc., p. 260-267.

Previously abstracted from *Journal of Metals.* See item 220-D, 1950. (D2, ST)

82-D. Fuel Consumption in the Open-Hearth Furnace. A. J. Fisher. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 268-275; disc., p. 275-276.

Relation of fuel consumption to bath design and size of heat, furnace efficiency, and flame efficiency. (D2, ST).

83-D. Optimum Firing Rates. G. C. Primm. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 277-282.

Factors affecting firing rate. Compares amount of fuel put into furnaces of different sizes in regard to furnace life. Data are tabulated and plotted. (D2, ST)

84-D. Present Status of Multiple Burners. L. D. Woodworth. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 283-286; disc., p. 286-287.

Favorable experiences at the Ohio Works, Carnegie-Illinois Steel Corp. Burner design. Compares furnace operations using single and double burners. (D2, ST)

85-D. A Study of Some of the Physical Characteristics of Acid Open-Hearth Slags. Charles R. Funk and Kenneth Midlam. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 292-307; disc., p. 307-312.

Physical appearance, chemical analysis, and petrographic analysis of thin sections prepared from pancake tests were studied. Tables, graphs, photographs, and micrographs. (D2, B21, ST)

86-D. Practical Interpretation of Steelmaking. C. F. Christopher. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 313-327; disc., p. 327-332.

Deals with the characteristics of steel under different conditions from the time it is ready to be deoxidized until it is finally heat treated. Types of defects and their causes. (D2, ST)

87-D. Operation of Blast Furnaces at Elevated Pressures. (In French.) Pol-Michel André. *Revue de Métallurgie,* v. 47, Dec. 1950, p. 873-888.

Theoretical studies and experimental research resulting in development of the process. Modifications of blast-furnace construction for operation with elevated pressure. Application to the French metallurgical industry. 37 ref. (D1, ST)

88-D. Influence of Duration of the Blast on Nitrogen Content of Basic Bessemer Steels. (In French.) M. Delong. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 7, nos. 8-10, (1950), p. 381-420.

Data on 42 charges of different compositions. Besides duration of the blast, a series of other factors, such as temperature of decarburization, internal shape of the converter, Si and P contents, etc., influence the N_2 content to a marked extent. In certain cases, the accelerated blast may even be harmful to the quality of the steel. (D3, ST)

89-D. Blast Furnace-Foundry Pig Iron With Hematite. (In Czech.) Jindrich Sarek. *Hutnické Listy,* v. 5, Nov. 1950, p. 443-445.

Fundamental difference between the quality of a coarse-grained foundry pig iron, and the influence of various factors on the grain size. Basic slags and mode of operation of the blast furnace are considered to be of most importance. (D1, Fe)

90-D. Thermal Analysis of Operation of an Openhearth Furnace. (In Czech.) Antonin Benda. *Hutnické Listy,* v. 5, Nov. 1950, p. 454-458.

Mathematical relationships are derived for openhearth furnace efficiency vs. specific heat and fuel consumption. Efficiency and fuel consumption are related to stack draft. Using the equations presented, means of improving efficiency can be deduced. (D2, ST)

91-D. Steel Ladle Refractories. Parts II and III. F. I. Cordwell. *Refractories Journal,* v. 26, Nov. 1950, p. 458-464; v. 27, Jan. 1951, p. 4-10.

Concludes review of recent technical progress. (D9, ST)

92-D. Statistical Analysis of Open Hearth Data. Wade R. Weaver. *Iron and Steel Engineer,* v. 28, Feb. 1951, p. 53-57; disc., p. 57-58.

Modern statistical tools available to the openhearth operator to help him in evaluating his operating data. (D2, S12, ST)

93-D. The Physical Chemistry of Steelmaking. Part II. (Concluded). Karl L. Fetters. *Industrial Heating,* v. 18, Feb. 1951, p. 265-266, 268, 274.

Research projects sponsored by various organizations, including the AISI, are reviewed. Results of this fundamental research and its advantages to the steel industry. (D general, P12, ST)

94-D. The Design of a New Open Hearth Shop. III. (Concluded). H. E. Warren, Jr. *Industrial Heating,* v. 18, Feb. 1951, p. 276, 278, 280.

Hot-topping facilities, cinder yard and skull crackers, strippers, fuel systems, instrumentation, and cooling. Information on yard track systems is included. (D2, ST)

95-D. Steelmaking for Castings. John Howe Hall. *Foundry,* v. 79, Mar. 1951, p. 98-99, 228-233.

Advantages and disadvantages of different steelmaking methods and equipment used in the foundry, including acid and basic electric furnace, side-blown converter, and openhearth. (To be continued.) (D5, D3, D2, CI)

96-D. European Research on Flame Radiation. Tom Bishop. *Metal Progress,* v. 59, Feb. 1951, p. 248, 249.

Research in Holland on design of openhearth furnaces and boilers for maximum radiation effect from a given flame. The work is being done cooperatively by scientists from France, Holland, Great Britain, and Sweden. (D2)

97-D. Finer Screening Ups Furnace Output 30 Per Cent. John D. Knox. *Steel,* v. 128, Mar. 5, 1951, p. 90, 99, 102, 105.

Summary of proceedings of blast-furnace session of the annual winter meeting of the Eastern States Blast Furnace and Coke Oven Assn., Pittsburgh, Feb. 16, 1951. (D1, Fe)

98-D. Application of Superimposed Precipitators. R. E. Touzalin. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 81-88; disc. p. 88-90.

Previously abstracted from *Journal of Metals.* See item 79-D, 1950. (D1, Fe)

99-D. Modern Blast-Furnace Gas Cleaning. G. P. Burks. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 91-98; disc. p. 98-103.

Previously abstracted from *Journal of Metals.* See item 147-D, 1950. (D1, Fe)

100-D. Gas-Washer Developments. Harry O. Johnson. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 104-110; disc. p. 110-111.

Stationary disintegrator gas washers at the Donora blast-furnace plant of the American Steel and Wire Co. (D1, Fe)

101-D. Disintegrators for Fine-Cleaning Blast Furnace Gas. Owen R. Rice and C. G. Bigelow. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 111-117; disc. p. 117-118.

Rotary disintegrators used by Freyn Engineering Co., Chicago. (D1, Fe)

102-D. Pig-Machine Practice at Hanna Furnace Corp. A. J. MacDonald. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 119-124; disc. p. 124-126. (D1, Fe)

103-D. The Pig Machine at Wisconsin Steel Works. R. P. Wheatley. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 127-129; disc., p. 129-130.

Layout. (D1, Fe)

104-D. Pig-Casting Practice at Woodward. H. A. Byrns. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 130-132; disc. p. 132-136.

Practice at Woodward Iron Co., Woodward, Ala. (D1, Fe)

105-D. Blowing Out Carbon-Hearth Furnaces. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 203-213; disc. p. 213-219.

"Data on Carbon Linings," C. G. Hogberg and "Progress Report on Causes of Failure of Carbon Hearths," H. M. Kramer. Operations at the following companies: Interlake Iron Corp., C. P. Johnson; Pittsburgh Steel Co., George D. Sells; Republic Steel Corp., H. F. Dobscha; Jones and Laughlin Steel Corp., H. P. Saxer; Bethlehem Steel Co., W. R. Zehner. (D1, Fe)

106-D. Use of Adirondack Sinter in Blast Furnaces. Elmer H. Riddle. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 268-277; disc. p. 277-280.

Previously abstracted from *Journal of Metals.* See item 76-D, 1950. (D1, Fe)

107-D. Lessons From a Hanging Blast Furnace. L. M. Fulton. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 280-292; disc. p. 292-297; 305-313.

Previously abstracted from *Journal of Metals.* See item 66-D, 1950. (D1, ST)

108-D. Conditions of Outstanding Blast-Furnace Operation. Kurt Neustaetter. *American Institute of Mining and Metallurgical Engineers,* "Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division," v. 9, 1950, p. 297-304; disc. p. 304-305.

Previously abstracted from *Journal of Metals.* See item 78-D, 1950. (D1, Fe)

109-D. Applications of the Statistical Analysis of Factors Affecting the Output of an Open-Hearth Furnace. P. Arnold and M. W. Thring. *Journal of the Iron and Steel Institute,* v. 167, Jan. 1951, p. 44-45.

A relation between carbon content of the fully melted steel, weight of oxygen required to oxidize C, Si, P, and Mn in the original charge, and rate of oxidation is derived. If a method of feeding the carbon black to the charge in soft melts were available, a 5% gain in output would result from reducing oxygen equivalent of the initial charge to give an average carbon at melt-out equal to the previous lowest permissible value. (D2, S12, ST)

110-D. Trials of an Experimental Austeel-Escher Metallic Recuperator. J. B. Davis, W. Ernest, and H. Kay. *Journal of the Iron and Steel Institute,* v. 167, Jan. 1951, p. 66-70.

Experimental procedure and some of the more important data obtained with recuperator developed originally in Australia. (D2, ST)

111-D. The Drying of Ironstone. R. C. Walthew. *Metallurgia,* v. 43, Jan. 1951, p. 29-30. (A condensation)

Practice of a British firm in drying two different types of iron ore before charging to the blast furnace. Partial drying is said to be advantageous for facilitating grading and handling. (D1, Fe)

112-D. The Control of Steel Quality. G. Reginald Bashforth. *British Steelmaker,* v. 17, Feb. 1951, p. 89-97.

Defects commonly experienced in steel production and treatment. Methods for the reduction or prevention of these imperfections. (D general, S12, ST)

113-D. Model Research; Applications in the Steel Industry. Frances Mortimer. *Iron and Steel,* v. 24, Feb. 1951, p. 39-44, 50.

Work on BISRA's 1/5-scale experimental openhearth furnace has been terminated. Work will be continued on smaller bench-size models, which can provide quickly, cheaply, and accurately the same information as the larger model, and the results can be applied directly to production furnaces. Past work and the various small and large models which have been investigated in Britain. Includes side-blown converters, blast furnaces, and gas producers. 20 ref. (D2, D1, D3, ST)

114-D. The Steel Melting Practice Adopted at Iscor Works, Pretoria. C. P. Warden. *Journal of the Chemical, Metallurgical and Mining Society of South Africa,* v. 51, Nov. 1950, p. 177-193; disc., p. 193-197.

Acid bessemer and the basic open-hearth process, and method of slag control. Details of the duplex process; effect of duplexing on rate of furnace production. (D7, ST)

115-D. Fabrication and Properties of Low-Nitrogen Basic Bessemer Steels. (In French.) **Introduction.** P. Coheur. **I. Use of Limestone as a Flux.** P. Coheur. **II. Use of an Oxygen-Water Vapor Mixture.** J. Daubersy. **III. Mechanical-Test Results.** L. Marbais and M. Nepper. **IV. Statistical Study of the Influence of Composition on the Mechanical Properties of Thin Sheets.** M. Nepper and L. Dor. *Revue Universelle des Mines, de la Métallurgie des Travaux Publics, des Sciences et des Arts appliqués à l'Industrie,* ser. 9, v. 6, Dec. 1950, p. 401-430.

Results of experimental study. Apparatus and data. 34 ref. (D3, Q general, CN)

116-D. Influence of Additions of Calcium Oxide on Behavior of Manganese and Silicon During Acid Steelmaking. (In Russian.) I. A. Popov and B. V. Stark. *Izvestiya Akademii Nauk SSSR)* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Dec. 1950, p. 1806-1814.

Influence of CaO additions was studied experimentally. Dependence of equilibrium constants of the Mn and Si reactions on temperature was determined. Influence of CaO in acid slag is proportionately much less at a content of less than 7.8% than at higher concentrations. Correction factors were determined for calculation of equilibrium constants taking into consideration the influence of CaO additions. (D2, ST)

117-D. Evaluation of the Quality of Blast-Furnace Coke. (In Polish.) Franciszek Byrtus. *Hutnik,* v. 17, July-Aug. 1950, p. 183-189.

Reviews existing methods. Theoretical bases of each method are analyzed. Technique of testing, including evaluation of data. (D1, B18, Fe)

118-D. Continuous Casting of Steel at Babcock & Wilcox Tube Co. Isaac Harter, Jr. *Journal of Metals,* v. 3, Mar. 1951, p. 223-226.

See abstract of "Babcock & Wilcox Tube Company Develops Continuous Casting," *Iron and Steel Engineer;* item 3-D, 1951. (D9, ST)

119-D. Some Observations on the Continuous Casting of Steel. *Journal of Metals,* v. 3, Mar. 1951, p. 227-228. (From talk by Irving Rossi.)

Methods and apparatus developed by Continuous Metalcast Corp., New York, which are in regular production in many of the nonferrous industries and in the continuous casting of steel at the Watervliet plant of Allegheny Ludlum Steel Corp. (D9, ST, EG-a)

120-D. Atmospheric Pollution. Louis C. McCabe. *Industrial and Engineering Chemistry,* v. 43, Mar. 1951, p. 89A-90A, 92A.

Data on the first electrical precipitator installed on an openhearth furnace. It is operating at 97.9% efficiency, and is located at Columbia Steel Co.'s Torrance, Calif., works. (D2, A7, ST)

121-D. Carbon Disintegration Test for Blast-Furnace Brick. L. J. Trostel. *Journal of the American Ceramic Society,* v. 34, Mar. 1, 1951, p. 76-81; disc. p. 81-82.

Apparatus and procedure using CO for testing the resistance of blast-furnace brick. The apparatus is simple to operate, automatic, and can handle 60 specimens at a time. (D1)

122-D. Radioactive Indicators for Blast-Furnace Refractory Wear. E. W. Voice. *Journal of the Iron and Steel Institute,* v. 167, Feb. 1951, p. 157-161.

Techniques using cobalt-60. Appendix III, by T. E. Dancy, gives data on evaporation of Co at 1550° C., which are required to indicate the stability of the cobalt-60 pellets during long-term experiments. (D1, S19, Fe, Co)

123-D. (Book) **Productivity in the Blast Furnace and Open Hearth Segments of the Steel Industry, 1920-1946.** William T. Hogan. 150 pages. Fordham University Press, 22 Park Place, New York 7, N. Y. $4.00.

Changes in productivity in blast furnace and openhearth operation, physical volume, cost of production, and methods of operation. Advantages and disadvantages of new methods, success in new inventions, and adaptations of these are analyzed in detail. (D1, D2, A4, ST)

124-D. Manufacture of Quality Steel in Russia. N. H. Polakowski. *Metal Progress,* v. 59, Mar. 1951, p. 359-363.

An expatriate tells of some of the difficulties the steelmaker faces, some of them due to official regulations governing details of technical practice worked out to cover ideal situations. No fundamental improvements have occurred in the art and science of steel manufacture and treatment. Equipment generally is modern since a 6-fold expansion has taken place in the last 20 years. Quantitative information concerning compositions and processes, including salt baths and atmospheres for heat treatment, cyaniding, and carburization, also on refractory life, and rolling mills, tube-making, etc. (D general, F general, J general, ST)

125-D. Economics of a 500-Ton Open Hearth Furnace. W. W. Kompart. *Iron and Steel Engineer,* v. 28, Mar. 1951, p. 55-57; disc., p. 57.

Furnace at Weirton Steel Co., Weirton, W. Va. Economic and technological considerations. (D2, ST)

126-D. Operating Advantages and Limitations of Open Hearth Controls. B. B. Bargman. *Iron and Steel Engineer,* v. 28, Mar. 1951, p. 91-95; disc., p. 95-97.

Control of fuel, air, steam, furnace pressure, furnace reversal, and temperature. (D2, S18, ST)

127-D. Pressure Operation of Blast Furnaces—1950. R. P. Liggett. *Blast Furnace and Steel Plant,* v. 39, Mar. 1951, p. 324-326, 332.

Experiences of Republic Steel Corp. during the past year. (D1, ST)

128-D. Treatment of Bricks to Prevent Carbon Monoxide Disintegration. J. A. Shea. *Blast Furnace and Steel Plant,* v. 39, Mar. 1951, p. 333-336.

See abstract of "How to Prevent Blast Furnace Lining Disintegration," *Steel,* item 318-D, 1950. (D1)

129-D. New Ingot Mold Castings Are in Use. J. J. Golden. *Iron Age,* v. 167, Mar. 29, 1951, p. 83-85.

Four substitutes for tar coatings of ingot molds were thoroughly tested. Darmold and Hydropaste were not satisfactory but Darmold AE has been tentatively adopted at Gary Steel Works. New types of applicators developed for the newer coatings. (D9, ST)

130-D. Quenching and Digging Out a Blast Furnace. K. C. McCutcheon, W. E. Marshall, and H. C. Barnes. *Journal of Metals,* v. 3, Apr. 1951, p. 304-310.

In the Spring of 1948 an experimental run was made in a small blast furnace, using various proportions of ore and pelletized magnetite concentrates, ending up with an iron-bearing burden consisting of 100% pellets made from Minnesota taconite. The run demonstrated that increasing amounts up to 100% pel-

lets could be used in this furnace, and corroborated laboratory findings on good reducibility of pellets. Results found after completion of the production run, when the furnace was cooled off in neutral atmosphere and dug out from the top down. (D1, ST)

131-D. Inside the Blast Furnace. *Steelways,* v. 7, Mar. 1951, p. 16-17.

Pictorial flow chart shows how iron ore is converted to iron. (D1, ST)

132-D. Desulphurizing Molten Iron With Calcium Carbide. S. D. Baumer and P. M. Hulme. *Journal of Metals,* v. 3, Apr. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, p. 313-318.

Laboratory tests made in the late 30's showed that carbide is an excellent desulfurizing agent for molten Fe; however, it is very difficult to make it react because it usually floats as a dry powder on top of the metal. Various methods of obtaining intimate contact have been investigated. Details of laboratory and pilot-plant development of a gas-injection, screw-feed method. Results show feasibility of the process on either a batch or continuous basis. Over 90% of the S content is removed. When less than 0.06-0.08% S is desired in the product, the process is believed to be economically feasible. (D general, Fe)

133-D. Distribution of Sulphur Between Liquid Iron and Slags of Low Iron-Oxide Concentrations. R. Rocca, N. J. Grant, and J. Chipman. *Journal of Metals,* v. 3, Apr. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, p. 319-326.

Desulfurization of liquid Fe by reducing slags of the electric furnace type was studied from 65 heats. Variations were made in basicity over a wide range and in FeO up to about 5% to determine their effects on desulfurization. The role of FeO in desulfurization from the blast furnace, to the electric furnace, to the oxidizing conditions of the open-hearth is shown to fit a relatively simple pattern of behavior. 17 ref. (D general, Fe, ST)

134-D. Heat Losses in Electric-Arc Steel Furnaces. (In Russian.) N. V. Orkorokov. *Promyshlennaya Energetika* (Industrial Power), v. 7, Dec. 1950, p. 1-5.

The problem was studied theoretically. Formulas are derived for calculation of heat losses under different conditions of operation. Methods of reducing heat losses through the lining of the furnace and into the cooling water. (D5, ST)

135-D. Production of Blast-Furnace Coke From Other Than Type PS Coals. (In Russian.) Ya. M. Obukhovskii. *Ugol* (Coal), v. 25, Dec. 1950, p. 15-19.

"Type PS" is the standard coking type. The possibility of introducing certain long-flame coals into the coke charge of blast furnaces was investigated. Experimental work showed that a savings of 325,000 tons per year of scarce coals of the PS type may be effected. Optimum lump-size ranges for different types of cast iron were determined. (D1, B18, Fe)

136-D. The Physical Chemistry of Steelmaking. Karl L. Fetters. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 15-24.

The problem; the more important work and workers; the principal tools of research and philosophies of research workers; contemporary work in the field, including AISI currently sponsored projects; and a look at the future. (D general ST)

137-D. The Design of a New Open Hearth Shop. H. E. Warren, Jr. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 53-77.

Previously abstracted from *Industrial Heating.* See item 22-D, 1951. (D2, ST)

138-D. The Use of Sintered Pyrrhotite Residues on the Production of Low Phosphorus Pig Iron. L. A. Miller. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 91-105.

Sinter used at the Lyles-Wrigley, Tennessee Furnace; the furnace; practice at low, medium, and high blast heat; and present operation. (D1, CI)

139-D. Pressure Operation of Blast Furnaces—1950. R. P. Liggett. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 233-243.

Previously abstracted from *Blast Furnace and Steel Plant.* See item 127-D, 1951. (D1, ST)

140-D. Manufacture of Deep Drawing Steel. R. W. Evans. *Engineer,* v. 191, Mar. 9, 1951, p. 306-309; Mar. 16, 1951, p. 338-340.

Properties of the blank which must undergo deformation, and the steelmaking technique which governs chemical analysis and ingot structure. First installment: the deep drawing operation in general, correlation of deep drawing with other properties, steel ingot requirements (structure and composition), and age hardening effects. Second

part: the manufacturing process, hearth maintenance, plant layout, furnace design and repair, comparison with the U. S., and future prospects. (D2, G4, CN)

141-D. Oxygen in the Production of Carbon Steels From the Arc Furnace. A. C. Brearley. *Foundry Trade Journal,* v. 90, Mar. 22, 1951, p. 303-309.

Experiences of K. & L. Steelfounders, Ltd., in Britain. Practice prior to use of oxygen, then early experimental work and problems encountered. Observations made during a trip to America. Details of present procedure for both acid and basic electric steel melting, and economics involved. (D5, ST)

142-D. Review of Work on Blast Furnace Reactions. J. Taylor. *Journal of the Royal Technical College,* v. 5, Jan. 1950, p. 181-189.

Reviews work described in "The Effect of Operating Conditions on Type of Reduction and Carbon Rates in the Blast Furnace," *Journal of the West of Scotland Iron Steel Institute,* v. 54, 1946-47. See item 2B-204, 1948. (D1, ST)

143-D. The Reactions of Sulphur in Steelmaking. I. The Physical Chemistry of Sulphur Removal in Steel Making. P. T. Carter. *Journal of the Royal Technical College,* v. 5, Jan. 1950, p. 190-198.

Summary of a paper which appeared in "General Discussion on the Physical Chemistry of Process Metallurgy," *Faraday Society,* 1948 (item 2B-308, 1949). Effects of temperature and basic constituents of the slag are discussed at greater length and more detailed thermodynamic data are given. 27 ref. (D general, P12, ST)

144-D. Contribution to the Metallurgy of the Blast Furnace. (In German.) Theo Kootz and Willy Oelsen. *Archiv für das Eisenhüttenwesen,* v. 22, Jan.-Feb. 1951, p. 1-4.

Based on laboratory experiments on the reduction of iron ore, reactions in the blast furnace are explained; especially the importance of CO decomposition and effect of nascent carbon. Results indicate the probability that SiO_2 is reduced after Fe and P compounds, but before MnO_2 and before the melt is desulfurized. (D1, Fe)

145-D. Deoxidation of Steel With Acid Synthetic Slags. (In German.) Max Paschke and Günter Gesche. *Archiv für das Eisenhüttenwesen,* v. 22, Jan.-Feb. 1951, p. 5-8.

Experiments show that oxidation with acid slag (CaO-SiO_2 ratio: 0-0.8) is materially affected by SiO_2 content and viscosity. Al_2O_3 merely affects viscosity of the slag, and a far better deoxidizing effect is obtained in a sand crucible than in a corundum crucible. (D general, ST)

146-D. Chemical and Physicochemical Bases of Deoxidation With Manganese, Silicon, and Aluminum. (In German.) Walter Koch, Hanns Wentrup, and Otto Reif. *Archiv für das Eisenhüttenwesen,* v. 22, Jan.-Feb. 1951, p. 15-29; disc. p. 29-30.

Experiments on inclusions formed by simultaneous deoxidation of steel with Mn, Si, and Al show that their compositions are not in equilibrium with the final compositions of the melts, but that they are materially affected by the deoxidizing reaction. Type of inclusion as well as degree of deoxidation is dependent on Mn: Si ratio. Includes photomicrographs and X-ray diffraction patterns. 16 ref. (D general, ST)

147-D. Iron Sparks Produced During Bessemerizing in a Small Converter. (In German.) E. J. Kohlmeyer. *Giesserei,* v. 38 (new ser., v. 4), Feb. 22, 1951, p. 73-76.

Experimental studies with an iron containing 4.3% C indicate that iron evaporates at 1300° C. in the form of unstable FeCO, which decomposes, after leaving the melt, into Fe and CO. If the melt is made in the absence of oxygen (air or iron oxide), the vaporized iron can be recovered in the form of a very fine powder. Includes diagram of the Fe-C-O_2 system and illustrations showing the appearance of the sparks discharged from the converter under various conditions. (D3, ST)

148-D. Production of Low-Phosphorus and Low-Nitrogen Steels by Use of Exothermic Addition Agents. (In German.) Heinz Höfges and Jakob Willems. *Stahl und Eisen,* v. 71, Mar. 15, 1951, p. 283-287.

Experiments were made with steels melted at low temperatures in the basic furnace in order to determine the phosphorus and nitrogen-reducing effect of ferrosilicon, Ca-Si, Al, and CaC_2. Best results were obtained with Ca-Si, while ferrosilicon and CaC_2 liberated practically no heat. 21 ref. (D2, ST)

149-D. Steelmaking for Castings. John Howe Hall. *Foundry,* v. 79, Apr. 1951, p. 128-129, 263-271.

Design features of the openhearth furnace and its method of operation. (Second of a series covering melting practice in the steel foundry; to be continued.) (D2, CI)

150-D. The Evolution of the All-Carbon Blast-Furnace. J. H. Chesters, G. D. Elliott, and J. Mackenzie. *Journal of the Iron and Steel Institute,* v. 167, Mar. 1951, p. 273-282.

The use of carbon bricks in the blast furnace is traced from the early hearth experiments, designed to minimize breakouts, to the use of three all-carbon blast-furnaces by a British steelmaker. Trials of carbon bricks in bosh and stack with particular reference to scaffold formation. (D1, ST)

151-D. Ingot Heat Conservation; Ingot Mould Temperature Measurements. R. T. Fowler and J. Stringer. *Journal of the Iron and Steel Institute,* v. 167, Mar. 1951, p. 283-288.

Further measurements on surface temperatures of an ingot mold were made, and the technique of temperature measurement by fixed thermocouples was extended to include temperatures through the walls. Two trials were made with the mold initially at a temperature of 30° C., and one trial with it at 125° C., the latter being representative of normal practice. Temperature gradients and isotherms are plotted to give a picture of the overall temperature distribution throughout the mold at various times after teeming. Heat content of the mold was calculated and amount of heat removed from the steel during solidification estimated. (D9, S16, ST)

152-D. Ten-Ton Ingot Moulds; A Comparison of Design and Conditions of Use. A. Jackson. *Journal of the Iron and Steel Institute,* v. 167, Mar. 1951, p. 289-301.

Design and life of two types of 10-ton molds and bottom plates are compared under normal conditions of use. Results of detailed experiments, designed to indicate effect of certain variables in conditions of use. Effects of short and long tap-to-strip times and normal and long cooling times between heats. Various types of failures. Experiments on heating and cooling rate of molds, effects of annealing on mold life, etc. (D9, ST)

153-D. Combustion in the Open Hearth Furnace. J. M. Brashear. *Blast Furnace and Steel Plant,* v. 39, Apr. 1951, p. 421-425, 476.

Attempts to correlate ignition velocities, heating values, and maximum heat-delivery capacity for given combustion volumes. (D2)

154-D. Hazards of Back-Drafting. Owen R. Rice. *Iron and Steel Engineer,* v. 28, Apr. 1951, p. 118-122; disc. p. 122.

Proper procedure to be used in back-drafting of blast furnaces in order to avoid explosions. (D1, Fe)

155-D. Open Hearth Furnaces "Jet Tapped" in 30 Seconds. *Steel,* v. 128, Apr. 30, 1951, p. 64, 67, 78.

Full initial flow of steel reduces tapping time, taphole maintenance, and skull production and contributes to increased output of open-hearth shop. Bazooka-type projectile is fired with complete safety. Procedure for assembling, storing, and detonating the castings device. (D2, ST)

156-D. Protect Blast Furnace Linings From Carbon Monoxide Disintegration. *Brick & Clay Record,* v. 118, Apr. 1951, p. 84, 87.

Treatment of brick-work with sulfur and chloride compounds either by soaking, dipping, spraying, or adding the chemical to the bonding material. (D1)

157-D. Refractories From the User's Point of View. W. L. Kerlie. *Refractories Journal,* v. 27, Mar. 1951, p. 84-95; disc. p. 95-96.

Factors influencing the choice of refractory material. Performance from the point of view of iron and steel production. Recent developments and trends insofar as blast furnaces, coke ovens, mixers, basic bessemer converters, casting practice, and reheating furnaces are concerned. Special consideration to openhearth bottoming and fettling consumption and the serious effect of the hearth-metal reaction, particularly with the more highly oxidized (or low-carbon) steels. Suggested that the FeO in the liquid steel is one of the major factors leading to hearth erosion. (D general, ST)

158-D. Ingot Moulds; Practical Aspects of the Quasi-Bessemerizing Process. W. S. Williams. *Iron and Steel,* v. 24, Apr. 1951, p. 113-114, 123.

Apart from accidental causes there are three major factors which limit the lives of closed-end molds: soft bases, cracking, and crazing. The first cause can be eliminated by one of two methods—the quasi-bessemerizing process or the use of steel plates. Factors influencing the choice of method. (D9, ST)

159-D. Steel Composition and Ingot Cracks. G. Reginald Bashforth. *British Steelmaker,* v. 17, Apr. 1951, p. 198-202.

Adverse effects of residual elements in rolling properties of steel, the phenomenon of peritectic change, and cracking caused by sulfur both in the ingot stage and during subsequent cogging. Reviews the more important production checks in controlling incidence of the defects described. (D9, F21, ST)

160-D. Operation of a Large French Blast Furnace. (In French.) J. Cyther and A. Denys. *Revue de Metallurgie,* v. 48, Feb. 1951, p. 73-84.

Installation and operation of a blast furnace with a crucible 6.50 m. in diam. (D1, Fe)

161-D. Refining of Phosphorus Cast Iron by Oxygen in the Openhearth Furnace. (In French.) G. Husson and P. Bettembourg. *Revue Métallurgie,* v. 48, Feb. 1951, p. 135-139.

Results of systematic investigation on an industrial scale. The wide possibilities of this method are emphasized. (D2, CI)

162-D. Investigations of Oxygen-Enriched Blast in Bessemer Converters. (Concluded.) (In French.) P. Leroy and E. Devernay. *Revue de Métallurgie,* v. 48, Feb. 1951, p. 140-158; disc. p. 158.

Influence of O_2 enrichment on blast conditions, inconvenience of use of a blast enriched with 40% O_2, and consumption of injected O_2. Indicates that the optimum amount of O_2 is about 30%. Complete details of experimental results are tabulated in an appendix. 16 ref. (D3, ST)

163-D. Steelmaking for Castings. John Howe Hall. *Foundry,* v. 79, May 1951, p. 101, 222-229.

Openhearth furnace refractories and constituents of the metal charge. Third of a series. (To be continued.) (D2, ST)

164-D. Is the Reduction of Iron Ore by Hydrogen a Commercial Possibility? *Metal Progress,* v. 59, Apr. 1951, p. 523-526.

Companion articles by P. E. Cavanagh and Harry W. McQuaid present pessimistic and optimistic viewpoints, respectively. (D8, Fe)

165-D. SiO in Acid Steel. *Metal Progress,* v. 59, Apr. 1951, p. 552, 554, 556. (Translated and condensed from "Silicon Monoxide in the Melting of Acid Steel", P. V. Gel'd, A. I. Kholodov, and N. N. Buinov.

Previously abstracted from *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR). See item 142-D, 1950. (D5, M21, ST)

166-D. Jet Tapping. Harold Walker and A. Robert Almeida. *Journal of Metals,* v. 3, May 1951, p. 374-376.

New development at Republic Steel Corp. A shaped explosive charge is used to tap the openhearth. Nearly 2500 units have been fired to date, with only occasional failures. (D9, D2, ST)

167-D. Safety Precautions in Jet Tapping. R. H. Ferguson. *Journal of Metals,* v. 3, May 1951, p. 377-378.

See item 166-D, above. (D9, D2, ST)

168-D. Structure of the Yellow Crystalline Fracture of Blast-Furnace Salamander. John R. Weeks, Dan McLachlan, Jr., and John R. Lewis. *Journal of Metals,* v. 3, May 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 393-394.

During operation of the iron blast furnace, aggregates of hard, infusible, yellow, cubic crystals frequently form in the interstices of the lining and on the hearth of the furnace. These were first examined by Wohler and were identified as a complex cyanonitride of Ti, having the formula $Ti(CN)_2 \cdot 3Ti_3N_2$. Analytical and spectrographic work indicates that this compound does not exist. (D1, M26, Fe)

169-D. Vertical Solidification of Steel Ingots Studied. J. W. Spretnak. *Iron Age,* v. 167, May 3, 1951, p. 107-110.

Shows that heat removal in transverse solidification occurs by radiation while, in vertical solidification, both radiation and conduction take place. Vertical solidification, particularly in the lower portion, determines nature of segregation and extent of "A" and inverted "V" porosity patterns. (D9, N12, ST)

170-D. Oxidation Practice in Acid Electric Steel Melting Furnaces. *Industrial Heating,* v. 18, Apr. 1951, p. 647, 648, 650.

Summarizes "Oxygen Practice", by R. H. Jacoby and J. H. Garrison; and "Ore Practice", by F. J. Stanley and W. L. Doyle. These papers were presented at the Acid Session on Oxidation of the Electric Furnace Steel Conference, AIME, Dec. 7-9, 1950, in Pittsburgh. (D5, ST)

171-D. Cold Metal and Basic Foundry Practice. I. *Industrial Heating,* v. 18, Apr. 1951, p. 654, 656, 658, 660.

Summarizes two papers presented at a session of 33rd National Open Hearth Conference of the AIME, Cincinnati, Ohio: "The Use of Graphite in Cold Metal Changes", Clyde B. Jenni; and "Quality of Raw Materials", Gordon McMillin and John R. Patton. (D2, ST)

172-D. Zebra Type Open-Hearth Roof Steps Up Heats Per Campaign. *Steel,* v. 128, May 7, 1951, p. 126, 128.

Increased openhearth steel production has been made possible by development of the above roof which incorporates silica and basic brick in alternate courses. The silica brick, which have high strength, insure a mechanically stable roof; the basic brick, which have superior resistance to chemical attack, wear away more slowly and protect the silica

brick. The result is a roof which is intermediate in cost and durability between one made of 100% silica and one made entirely of basic brick. (D2, ST)

173-D. Ladle Refractories and Practice in Acid Electric Steel Foundry. Clyde H. Wyman. *American Foundrymen's Society,* Preprint 51-64, Apr. 1951, 7 pages.

Properties and mixes of ganisters for the linings of various parts of foundry ladles, their installation, drying, and preheating. Designs for stoppers, nozzles, and ladles. (D9)

174-D. Direct Reduction of Iron Ore Using the Fluidized Solids Technique. M. Tenenbaum and C. M. Squarcy. *American Iron and Steel Institute,* Preprint, 1951, 32 pages.

The fluidized-solids approach to the handling of finely divided materials provides conditions of gas-solid contact that appear ideal for promoting the reactions involved in the direct reduction of iron ores. Reduction tests in the static and fluidized states were conducted on six different iron oxide bearing materials. The static tests provided basic data on reduction characteristics of the various oxides. In most of the experiments it was possible to obtain and maintain a fluidized system and to effect some reduction; however, complete reduction was seldom approached and never attained. (D8, Fe)

175-D. Significance of Air Temperature in Open Hearth Operation. John S. Marsh. *American Iron and Steel Institute,* Preprint, 1951, 16 pages.

A measuring device was designed and built that proved to be an extraordinarily sensitive tool for diagnosing furnace behavior. A principal finding is that air temperature has large influence on heat time, to the extent that heat time is inversely proportional to air temperature. For a given furnace and range of fuel input, the principal determiner of air temperature is air leakage. Judging by operating records, most openhearth furnaces are deficient in air temperature. (D2, S16, ST)

176-D. Oxygen as a Means of Increasing Bessemer Production. W. G. McDonough. *American Iron and Steel Institute,* Preprint, 1951, 18 pages.

Procedures, equipment, and results of plant-scale experiments in an acid bessemer converter at National Tube Co.'s National Works Plant, McKeesport, Pa. (D3, ST)

177-D. The Effect of Sinter on Blast Furnace Production as Determined by Analysis of Daily Operating Data. W. E. Marshall. *American Iron and Steel Institute,* Preprint, 1951, 11 pages.

Various factors affecting blast-furnace operation, of which sinter is only one. Results of a statistical study using 1000 daily values. (D1, Fe)

178-D. Cleaning Ferromanganese Blast Furnace Gas. C. A. Bishop, A. H. Brisse, R. G. Thompson, C. R. Liebel, and W. A. Swaney. *American Iron and Steel Institute,* Preprint, 1951, 16 pages.

The dust found in ferromanganese blast-furnace gas is of two types. One type, comprising about 20% of the dust present, consists of particles of about 20 microns in size. This fraction is removed by a conventional dust catcher. The other type, which amounts to 80% of the solids present, is a typical fume, with particle sizes varying from 0.10 to 1.0 micron. A practical method is developed for removing and disposing of this fume. Preliminary and laboratory tests, of three types of equipment; the briquetting process adopted; pilot-plant work; spray conditioning; electrical precipitation; burning; leaching; filtration; and drying. (D1, A8, Fe)

179-D. Ironstone; Drying Procedure at Appleby-Frodingham. R. C. Walthew. *Iron and Steel,* v. 24, May 1951, p. 157-159.

Previously abstracted from condensed version with similar title appearing in *Metallurgia.* See item 111-D, 1951. (D1, Fe)

180-D. Italian Steel; Features of Some Northern Works. J. M. Butler. *Iron and Steel,* v. 24, May 1951, p. 163-167.

Features of five Italian steelmaking plants, including ore preparation, blast furnace and electric reduction, bessemer, openhearth, electric and induction refining. (D general, B general, ST)

181-D. Significance of Equilibrium and Reaction Rate in the Blast-Furnace Process. J. B. Austin. *Journal of the Iron and Steel Institute,* v. 167, Apr. 1951, p. 358-363.

Some of the ways in which physicochemical methods are useful in investigating the blast furnace process. On the basis that all the reduction is "indirect", it is possible to set up a thermodynamically ideal, isothermal process, operating at minimum consumption of carbon. Comparison of this minimum with the amount of carbon required as fuel indicates that, in a furnace producing the common grades of Fe from Mesabi ores, the requirement

for carbon is determined primarily by the need for a reducing agent. 13 ref. (D1, Fe)

182-D. Joint Discussion on the Papers: "The Thermodynamic Background of Iron and Steel Making Processes. Part I. The Blast-Furnace," F. D. Richardson and J. H. E. Jeffes; and **"The Influence of Gas/Solid Temperature Differences on Blast Furnace Operation,"** J. Taylor. *Journal of the Iron and Steel Institute,* v. 167, Apr. 1951, p. 378-382.
(D1, Fe)

183-D. Joint Discussion on the Papers: "Blast-Furnace Gas Cleaning. An Analysis of Plant Performance," R. F. Jennings; and **"Blast-Furnace Gas Cleaning. Methods for Calculating the Motions of Particles in a Gas,"** J. Stringer. *Journal of the Iron and Steel Institute,* v. 167, Apr. 1951, p. 383-387.
(D1, Fe)

184-D. Joint Discussion on the Papers: "Proposals for the Modification of a Blast-Furnace Top to Give Controlled Burden Distribution," E. L. Diamond; and **"A New Blast-Furnace Stock-Rod Gas Seal,"** E. J. Walklate. *Journal of the Iron and Steel Institute,* v. 167, Apr. 1951, p. 387-392.
(D1, Fe)

185-D. Evaluating Different Fuels. (In German.) Friedrich Lüth. *Stahl und Eisen,* v. 71, Mar. 29, 1951, p. 327-334.

A comparative study of combustion efficiency of nine steelworks fuels under a variety of conditions. (D general, ST)

186-D. Evaluation of the Economics of Materials in the Basic Bessemer Process With the Aid of Energy-Balance Computations. (In German.) Eduard Senfter, Gerhard Schnürch, and Helmut Guthmann. *Stahl und Eisen,* v. 71, Mar. 29, 1951, p. 334-343.

Includes experimentally determined tables, graphs, and nomograms on the basis of which a given plant can evaluate its energy consumption and suitability of charge, also of furnace design, and take necessary steps to reduce costs of operation. 13 ref. (D3, ST)

187-D. Influence of Concentration of Carbon Monoxide in Gases on Reducibility of Iron Ores and Agglomerates. (In Russian.) L. M. Tsylev. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Jan. 1951, p. 74-79.

Rate of reduction of certain Fe ores and agglomerates obtained from them at different temperatures and concentrations of CO in the gaseous mixtures ($CO + Co_2 + N_2$) and ($CO + N_2$). Method of investigation and experimental data for different ores and gas mixtures. (D1, Fe)

188-D. Peculiarities in Behavior of Carbonaceous Manganese Ores in the Blast Furnace Process. (In Russian.) A. L. Zagyanskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR) new ser., v. 76, Feb. 11, 1951, p. 721-722.

The influence of carbonaceous Mn ore additions on viscosity of a slag of the composition 23.9% SiO_2, 22.57% CaO, 14.8% MnO, 20.6% FeO, 4.67% Al_2O_3, and 6.35% MgO was determined. Method of investigation and results. (D1, Fe)

189-D. Instrumentation and Automatic Reversal System on Open Hearth Furnaces. C. E. Mortensen. *Blast Furnace and Steel Plant,* v. 39, May 1951, p. 533-539. (A condensation.)

System applied to each of the 30 openhearth furnaces in the Lackawanna, N. Y., plant of Bethlehem Steel Co. (D2, ST)

190-D. Status and Development of the Converting Process. (In German.) Walter Bading. *Stahl und Eisen,* v. 71, Apr. 12, 1951, p. 373-386; disc., p. 386-388.

Historical development of steel refining and statistical data to show that the earth's coal resources are insufficient to smelt existing iron ores. Recent experiments with the low-stack furnace and the high-pressure process in the blast furnace. Refining in the hearth furnace or the converter, and improving the properties of converted steel. Costs of operating different refining plants and possibilities of producing a low-nitrogen basic converter steel with properties similar to those of openhearth steel. 26 ref.
(D1, D2, D3, Fe, ST)

191-D. (Book) **Modellgesetze der Vergasung und Verhüttung.** (Model Laws of Gasification and Smelting.) Sergei Traustel. 88 pages. 1949. Akademie-Verlag, Berlin, Germany. (Scientia Chimica, Bd. 4.)

Application of the theory of similarity to chemical reactions and their secondary physical phenomena. Expands the theory previously confined to physics to the above fields. (D general, C21)

192-D. AISE Specification for Design of Hot Metal Ladles. I. F. Madsen. *Iron and Steel Engineer,* v. 28, May 1951, p. 119-122.

Includes tabular and graphical data. (D9)

193-D. Alan Wood Steel Company. T. J. Ess. *Iron and Steel Engineer,* v. 28, May 1951, p. 1A-18A.

Comprehensive illustrated description of plant at Conshohocken, Pa. Includes coke plant, blast furnaces, openhearths, blooming mills, plate mills, strip mills, plant services, specialty division, and special products. (D general, F general, ST)

194-D. Full-Scale Blast-Furnace Trials. J. A. Bond and T. Sanderson. *Journal of the Iron and Steel Institute,* v. 168, May 1951, p. 24-39.

Selected trials, showing benefits to be derived from better selection and preparation of raw materials, ore, and coke, and from use of increased amounts of sinter in the burden. Attempts to improve distribution of the burden by alteration of design and to accelerate reduction by means of steam injection. Demonstrates that full-scale trials are practicable in a large organization without undue disruption of normal routine and output. (D1, Fe)

195-D. The Present Position of the Converter Process; Economic Comparison With Other Steelmaking Processes. Bernhard Matuschka. *Journal of the Iron and Steel Institute,* v. 168, May 1951, p. 40-45.

Compares economic aspects of openhearth and basic Bessemer steel production. (D3, D2, ST)

196-D. Fuel Flow; Works Trial of a Metering Pump. A. L. Cude and J. Stringer. *Journal of the Iron and Steel Institute,* v. 168, May 1951, p. 46-51.

Plant trial of a metering pump installed on a 75-ton openhearth furnace and operation for a total of approximately 400 hr. The pump gave much greater consistency of flow than normal hand-valve regulation, but this did not reduce variability of roof temperature. Shows that the metering pump would offer a number of advantages over the conventional motorized valve, as a component of an automatic temperature controller. (D2, S16, ST)

197-D. Explosive Charge Taps O. H. Furnace Safely. *Steel Equipment & Maintenance News,* v. 4, May 1951, p. 12-13.

New process. (D9, ST)

198-D. Metallurgy in the Graphite-Bar Furnace. (In German.) W. Gödecke. *Giesserei,* v. 38 (new ser., v. 4), Apr. 19, 1951, p. 169-174.

A furnace lined with stabilized dolomite can be used for the highly basic melting of steels and cast iron and is especially adapted to the decarburization, deoxidation, dephosphorization, and desulfurization of steels and to the production of spheroidal cast iron of high malleability. Analysis of a decarburized 18-8 Cr-Ni steel shows a relatively low loss of Cr, Ni, and Mo. (D2, E10, ST, CI, SS)

199-D. Stabilized Dolomite and Its Application in Steelmaking. (In French.) Marcel Guédras. *Métallurgie et la Construction Mécanique,* v. 82, Nov. 1950, p. 835, 837-839, 841.

Suggests a modified Chester process for stabilizing dolomite by adding serpentine in order to transform lime into the trisilicate. The product is a highly resistant furnace-lining material, said to be superior to magnesite. (D general, B19, ST)

200-D. Status of the Use of Machinery in the Iron and Steel Industry. (In German.) P. Voltz. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, May 1, 1951, p. 341-348.

Innovations in blast-furnace plants, rolling mills, and forging mills. 12 ref. (D1, F22, F23, ST)

201-D. Non-Metallic Inclusions in Acid Openhearth Steel. (In Italian.) Alessandra Carlini. *Metallurgia Italiana,* v. 42, Dec. 1950, p. 435-456.

Identification of nonmetallic inclusions, their influence on mechanical properties of the finished product, and the influence of conditions of production on the amount and distribution of such inclusions. 31 ref. (D2, ST)

202-D. Open Hearth Charge Ores. John J. Golden and Henry E. Warren, Jr. *American Iron and Steel Institute,* Preprint, 1951, 15 pages.

Results of a questionnaire survey of 18 steel plants, covering 53 high-metal practices in 25 different furnace sizes with respect to quality requirements of basic openhearth charge oxides. (D2, B22, ST)

203-D. Steelmaking for Castings. John Howe Hall. *Foundry,* v. 79, June 1951, p. 109, 232, 234, 236, 238, 240.

Operation of the acid openhearth furnace, including typical heats. Fourth of a series on steel melting practice in production of castings. (To be concluded.) (D2, CI)

204-D. Statistical Analysis of Blast Furnace Production Data. D. S. Leckie. *Journal of Metals,* v. 3, June 1951, p. 443-444.

Procedures and equipment used; advantages. (D1, ST)

205-D. Sponge Iron a Remedy for Scrap Shortage? P. E. Cavanagh. *Steel,* v. 128, June 11, 1951, p. 92, 95, 98, 101.

If small tonnages of good, clean scrap are needed to make steel in electric furnaces, if a tunnel kiln is available, and if the steelmaker is willing to pay at least $40 a ton for scrap with no residual alloys,

it can be made by the tunnel-kiln sponge-iron process. Procedures and equipment. (D8, ST)

206-D. All-Basic Open Hearth Furnaces. *Engineer,* v. 191, May 18, 1951, p. 644-648; May 25, 1951, p. 696-697.

Summarizes proceedings of BISRA conference held May 2-3, 1951. Seven papers were presented and discussed. (D2, ST)

207-D. Blast-Furnace Operation at High Top Pressure. R. P. Towndrow. *Engineering,* v. 171, May 11, 1951, p. 575-576; May 18, 1951, p. 607-609. (A condensation.)

Details of work at Clyde Iron Works in Scotland. (D1, Fe)

208-D. Some Experience With Decarburization by Means of Oxygen in a 2-Ton Electric-Arc Furnace. (In Italian.) Luciano Piana. *Metallurgia Italiana,* v. 43, Jan. 1951, p. 20-26.

The 3 following systems were tested: consumable lance; unconsumable lance with a refractory-protected end; and blowing of O_2 through the electrodes of the furnace. Results obtained in a continuous run, some economic considerations, and conclusions based on the routine production of carbon and low-alloy steels. (D5, CN, AY)

209-D. The Effect of Sinter on Blast Furnace Production as Determined by Analysis of Daily Operating Data. W. E. Marshall. *Blast Furnace and Steel Plant,* v. 39, June 1951, p. 661-664.

Previously abstracted from *American Iron and Steel Institute,* Preprint. See item 177-D, 1951. (D1, Fe)

210-D. Open Hearth and Electric Furnace Refractories. James R. Cady. *Blast Furnace and Steel Plant,* v. 39, June 1951, p. 684-687.

Suitability of various types of refractories for various parts of the openhearth. 22 ref. (D2, ST)

211-D. Recent Technical Progress in Basic Steel Furnace Refractories. Part I. F. I. Cordwell. *Refractories Journal,* Apr. 1951, p. 128-137.

First part of international survey outlines experience and working data with chrome-magnesite crowns in openhearth steel furnaces, and economies and metallurgical advantages as compared with silica furnaces. (To be continued.) (D2, ST)

212-D. Possibilities of Iron & Steel Making in India Without Coking Coal. H. Schrader and D. Jagat Ram. *Journal of Scientific & Industrial Research,* v. 10A, Apr. 1951, p. 157-165.

Estimates that Indian reserves of coking coal are sufficient to melt only about 25% of the total available quantity of iron ore in the country. Potentialities of various processes for production of iron and steel without use of coking coal. 32 ref. (To be continued.) (D general, Fe, ST)

213-D. Electric Furnace or Open Hearth? C. F. Ramseyer. *Iron and Steel Engineer,* v. 28, June 1951, p. 57-67.

Proposed modern top-charge electric-furnace-steel meltshop designed to produce ordinary tonnage carbon steels at low cost. Estimated capital and operating costs. Assuming the availability of purchased power, data indicate that such a shop can be built for approximately half that of an openhearth shop of equivalent capacity, and that with 8-mill power it could make steel from an all-cold-scrap charge more cheaply than the openhearth. Such a shop would have an excellent chance of making steel from hot metal and scrap charges at an over-all production cost no greater than that of most modern openhearth plants. (D5, ST)

214-D. Storage and Distribution of Oxygen for the Open Hearth. B. P. Sarasin and R. Tietig, Jr. *Iron and Steel Engineer,* v. 28, June 1951, p. 81-89; disc., p. 89-90.

Recommendations for design: Charts show O_2 required for decarburization and for openhearth plants. Generation methods. Three types of distribution systems are diagrammed. (D2, ST)

215-D. Recent Developments at the Sydney Steel Plant. Norman A. Parlee. *Canadian Mining and Metallurgical Bulletin,* v. 44, June 1951, p. 382-387; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 234-239.

Developments during the past 5 yrs. and those now in process at Dominion Steel and Coal Corp., Sydney, Cape Breton Island, Nova Scotia. (D general, ST)

216-D. Research on the Deoxidation of Killed Openhearth Steel. (In French.) M. Nepper and H. Herbiet. *Revue Universelle des Mines, de la Métallurgie des Travaux Publics, des Sciences et des arts appliques a l'Industrie,* v. 94, Feb. 1951, p. 56-70.

Results of research on different heats. By using a series of different physical and chemical methods, an attempt was made to classify such steels on the basis of their internal macrostructure and to relate their quality to the deoxidation process. 12 ref. (D2, ST)

217-D. Slag Control in Openhearth Furnaces. (In Polish.) K. Radzwicke and F. Fiolkowna. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 1, 1951, p. 1-9.

Difficulties encountered with the slag-pancake method. Potentiometric, conductometric and volumetric methods for evaluating slag basicity were compared. A volumetric method was chosen. (D2, ST)

218-D. Refining of the Openhearth Bath With Oxygen. (In Polish.) J. Natkaniec. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 1, 1951, p. 47-53.

Advantages and disadvantages. Experiments on a 36-ton furnace in which 57 O_2 heats were made show an increase of furnace output of 15.4%, reduction of time for making the heat of 13.4%, decrease of consumption of ore of 58.7%, and of fuel of 17.3%. Very satisfactory results were also obtained from five heats where O_2 was used to melt scrap. Time of making the heat was reduced by 43.8% and furnace output increased by 77.8%. (D2, ST)

219-D. Effect on Quality of Metallurgical Coke of Reduction of the Coking Properties of Coke Blends by Coke-Breeze Additions. (In Polish.) F. Byrtus. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 2, 1951, p. 85-95.

Investigation using 6% coke breeze added to Upper Silesia coals on a semi-production scale. Increase of crushing strength and reduction of abradability resulted. Extensive investigations indicated suitability for the blast-furnace process. (D1)

220-D. Vanadium in the Acid Process for Steel Production and the Reducing Ability of Vanadium. (In Russian.) I. A. Popov and B. V. Stark. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Feb. 1951, p. 261-266.

Experimental investigation showed that, in acid openhearth slags containing V and consisting of oxides of Fe, Si, Mn, and V, the latter forms an isolated phase corresponding to the spinel type of compound $FeO{\cdot}V_2O_3$. The equilibrium constant for the V reaction and its temperature dependence for the acid process were determined. Reducing ability of V was found to be less than that of Si. 10 ref. (D2, ST, V)

221-D. Steelmaking for Castings. (Concluded.) John Howe Hall. *Foundry*, v. 79, July 1951, p. 77, 232-241.

Details of operating practice with the basic openhearth furnace. (D2, CI)

222-D. Control of Sulphur in Steelmaking. G. Derge and S. Marshall. *Journal of Metals*, v. 3, July 1951, p. 511-516.

Summarizes proceedings of AIME symposium held in Feb. 1951. (D general, ST)

223-D. Recent Developments in Ingot Mold Coatings. John N. Datesh. *Steel Equipment & Maintenance News*, v. 4, June 1951, p. 18-19.

Although more expensive than tar or pitch, commercial mold coatings are said to offset their original cost by improving ingot surface conditions and by eliminating objectionable fumes and handling difficulties. Macrographs show surface conditions of coated and uncoated molds. (D9, CN)

224-D. Advances in Stainless Steelmaking Practice. A. B. Scott. *Australasian Engineer*, Apr. 7, 1951, p. 44-50.

New equipment and procedures. (D general, SS)

225-D. Flow Patterns in Furnaces. J. H. Chesters. *Chemistry & Industry*, June 16, 1951, p. 448-455.

Summarizes research reported in recent papers in *Journal of the Iron and Steel Institute;* also work done since on three-dimensional geometrical systems, on hot models, and also on full-size openhearth furnaces. Technique in which Perspex dishes of different shapes, containing a suspension of bakelite powder in water, were used. Jets of water were introduced at different locations and flow patterns photographed. (D2, ST)

226-D. All-Basic Furnaces; Results Obtained From Six British and Two Dutch Open-Hearths. *Iron and Steel*, v. 24, June 1951, p. 199-203.

Summary of seven papers presented at a joint conference of British Ceramic Research Assn. and British Iron and Steel Research Assn., May 2-3, 1951. Data are tabulated; furnace designs are diagrammed and illustrated. (D2, ST)

227-D. Iron Making; Significance of Equilibrium and Reaction Rate. J. B. Austin. *Iron and Steel*, v. 24, June 15, 1951, p. 253-255; disc. p. 309-311.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 181-D, 1951. (D1, Fe)

228-D. U. S. Iron Production; Some Aspects of the Blast-Furnace Position. Owen R. Rice. *Iron and Steel*, v. 24, June 15, 1951, p. 256-265; disc., p. 311-314.

Technological and economic status of blast-furnace practice in the U. S. Comparison to operating data obtained from Great Britain, Netherlands, South Africa, India, and Brazil. The situation in iron ore, sinter, coal and coke, refractories including carbon linings, high-pressure operation, use of O_2, design and construction, manpower requirements, and total costs. (D1, Fe)

229-D. All-Carbon Blast-Furnaces; Their Evolution. J. H. Chesters, G. D. Elliott, and J. Mackenzie. *Iron and Steel,* v. 24, June 15, 1951, p. 266-271; disc., p. 311-314.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 150-D, 1951. (D1, Fe)

230-D. Radioactive Indicators; Detection of Blast-Furnace Refractory Wear. E. W. Voice. *Iron and Steel,* v. 24, June 15, 1951, p. 271-273; disc., p. 311-314.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 122-D, 1951. (D1, S19, Fe, Co)

231-D. Blast-Furnace Operation; Full-Scale Trials Without Undue Interference With Output. J. A. Bond and T. Sanderson. *Iron and Steel,* v. 24, June 15, 1951, p. 294-298; disc., p. 318-320.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 194-D, 1951. (D1, Fe)

232-D. Blast-Furnace Materials. III. Further Factors Influencing the Distribution of Solids. R. Wild. *Iron and Steel,* v. 24, June 15, 1951, p. 299-306; disc., p. 318-320.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 43-D, 1951. (D1, Fe)

233-D. Converter Process; Economic Comparison With Other Steelmaking Processes. Bernhard Matuschka. *Iron and Steel,* v. 24, June 15, 1951, p. 251-253; disc. p. 306-308.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 195-D, 1951. (D3, D2, ST)

234-D. Treatment of Nickel-Chromium-Molybdenum Steels. (In French.) *Circulaire d'Informations Techniques,* v. 8, no. 1, [1951], p. 75-96.

Report of committee of electric furnace steel engineers includes a report by M. Babel on testing of Ni-Cr-Mo steels and influence of refining conditions. Procedure and conclusions. (D5, AY)

235-D. Experimental Study of Factors Which Influence the Blast Pressure of a Blast Furnace. (In French.) P. Thierry, J. Szczeniowski, and J. Laborne. *Revue de Métallurgie,* v. 48, Mar. 1951, p. 187-193.

Results of study of pressures as a function of flow. Permeability of the bed to flow of gases, influence of blast section, and influence of temperature. (D1, Fe)

236-D. Some Properties of Iron Made in the Basic Bessemer Converter and Its Capacity for Dissolving Steel. (In French.) M. Moray. *Revue de Métallurgie,* v. 48, Mar. 1951, p. 194-198; disc., p. 198.

True temperature of the molten metal, its fluidity, its ability to dissolve steel, and its solidification temperatures were studied. (D3, ST)

237-D. Improvement of Apparatus for Metering Gas Flow. (In French.) R. Michaux and P. Leroy. *Revue de Métallurgie,* v. 48, Mar. 1951, p. 236-241.

Apparatus designed particularly for use in measurement of gas flow rates in the basic bessemer converter. How it may be used for systematic study of permeability of the charge to the blast as a function of properties of the ore and the limestone, of capacity and internal shape of the converter, and of arrangement and number of tuyeres. (D3, ST)

238-D. Hot Metal Cars and Mixers; How Design Factors Affect Lining Life. R. P. Heuer and C. E. Grigsby. *Steel,* v. 129, July 16, 1951, p. 82, 84, 87-88.

Second of series appraising refractories for handling hot metal. How equipment design, brick size, mortar quality, and type of bricklaying all enter into determining how long linings will remain serviceable. (D1)

239-D. The All-Basic Open-Hearth Furnace. *Metallurgia,* v. 43, June 1951, p. 289-294.

Summarizes 6 papers presented at recent British conference. Features of furnaces are described, diagrammed, and illustrated. (D2, ST)

240-D. Metallurgical Tests With the Solar Furnace. (In French.) F. Trombe and M. Foex. *Revue de Métallurgie,* v. 48, May 1951, p. 353-358.

A solar laboratory and some experiments on fusion of Fe in the solar furnace. Compares results obtained by different methods of heating. (D8, Fe)

241-D. Desulfurization of Pig Iron With Pulverized Lime. (In Swedish.) Bo Kalling, Christer Danielsson, and Ottar Dragge. *Jernkontorets Annaler,* v. 135, No. 3, 1951, p. 89-106.

Molten iron is brought into contact with powdered burnt lime under strongly reducing conditions. Lime must be kept in powdered form during treatment. By the treatment the iron can be desulfurized in a very short time without much heat loss. Data are tabulated and graphed. 15 ref. (D1, Fe)

242-D. Desulfurization of Hot Metal With Powdered Burnt Lime. (In Swedish.) Sven Fornander. *Jernkontorets Annaler,* v. 135, No. 3, 1951, p. 107-115.

Metal is transferred from blast furnace to rotary furnace and lime is added. About 90% of the sulfur is absorbed by the lime in 30 min. (D1, Fe)

243-D. Significance of Air Temperature in Open Hearth Operation. John S. Marsh. *Industrial Heating,* v. 18, June 1951, p. 1032, 1034, 1036, 1038, 1040, 1042; July 1951, p. 1224, 1226, 1228, 1230, 1232, 1326, 1328.

Previously abstracted from *American Iron and Steel Institute,* Preprint, 1951. See item 175-D. (D2, S16, ST)

244-D. Possibilities of Iron & Steel Making in India Without Coking Coal. (Continued.) H. Schrader and D. Jagat Ram. *Journal of Scientific and Industrial Research,* v. 10A, May 1951, p. 185-198.

A general review of various available methods. Metallurgical principles, working procedures, best-suited ores and fuels, economy and efficiency of various processes, namely the acid operating Renn process, the basic operating pig iron smelting in rotary kilns and the ore-coal-briquette smelting method. 20 ref. (D8, Fe)

245-D. Open Hearth Charge Ore—Key to Steel Capacity Expansion. Lewis B. Lindemuth. *Journal of Metals,* v. 3, Aug. 1951, p. 592-596.

Use of a higher amount of ore in ingot production. Factors affecting low ingot yield. Process used in the pilot plant. (D2, Fe)

246-D. Oxygen in Acid Electric Steel Production. J. H. Garrison. *Journal of Metals,* v. 3, Aug. 1951, p. 601-602.

Practice by Oklahoma Steel Casting Co. (D5, ST)

247-D. Ore Practice in Acid Electrics. F. J. Stanley. *Journal of Metals,* v. 3, Aug. 1951, p. 603-604.

The iron-ore melting practice in use at McConway & Tooley Corp., Pittsburgh. Data presented were obtained during the production of a series of 17 heats. (D5, Fe)

248-D. Effects of Manganese and Its Oxide on Desulphurization by Blast-Furnace Type Slags. Nicholas J. Grant, Ulf Kalling, and John Chipman. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 666-671.

Studies on the role of MgO in desulfurization as compared to CaO, the role of MnO in desulfurization, the role of mechanical stirring on the approach to equilibrium of S from metal to slag and the limiting reactions which constitute the slow steps in desulfurization. Table shows the composition of slag and metal samples taken at 1525° C. 10 ref. (D1, B21, CI)

249-D. Effect of Silica Reduction on the Desulphurizing Power of Blast-Furnace Type Slags. Nicholas J. Grant, Olaf Troili, and John Chipman. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 672-673.

The rate of removal of S from molten pig iron is affected by Si content of the iron. The results are interpreted as showing that SiO_2 in the slag is a sufficiently good oxidizing agent to interfere with the principal desulfurizing reactions. When sufficient Si is present to prevent further reduction of SiO_2, the transfer of sulfur from metal to slag is extremely rapid. (D1, B21, CI)

250-D. Desulphurizing Action of Titanium in Steels. W. P. Fishel, William P. Roe, and James F. Ellis. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 674-676.

Reports the distribution of S between Fe and Ti in Fe-Ti-S alloys and in Fe-Ti-C-S alloys. The compound TiS was found, which exists as a separate phase at temperatures below 1200° C. Ti in steels reacts with S in preference to carbon. (D general, Ti, CN)

251-D. The Big Blowout; How the Bessemer Converter Makes Steel. *Steelways,* v. 7, July 1951, p. 16-17.

Colored diagrams and brief text explain the process in elementary terms. (D3, ST)

252-D. Blast Furnace Controlled Split-Wind Blowing at Algoma Steel Corp. William O. Bishop. *Iron and Steel Engineer,* v. 28, July 1951, p. 78-82; disc., p. 83.

History and development of split-wind blowing. Installation and operation at the Algoma blast-furnace plant. Furnace conditions. (D1)

253-D. Jet Tapping of Open Hearth Furnaces. H. H. Northrup. *Iron and Steel Engineer,* v. 28, July 1951, p. 83-86.

How explosives may be used to tap openhearth furnaces with economy and safety over the oxygen lance method. The method and equipment. (D9, ST)

254-D. Instrumentation and Control for Mixed Fuels and Oxygen in Open Hearth Furnaces. Martin J. Conway and Edward H. Cauger. *Iron and Steel Engineer,* v. 28, July 1951, p. 106-114.

Equipment for fuel oil temperature and viscosity control, furnace

pressure control, fuel control and summarization, O_2 and air summarization, atomizing system, and automatic reversal from time or maximum temperature. Control performance and maintenance are evaluated. (D2, S18, ST)

255-D. Pig Iron. B. M. Stubblefield. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 56-79.

History, methods of ore mining, beneficiation of the ore equipment used and production data. (D1, B general, Fe)

256-D. Open-Hearth Steel. L. F. Reinartz. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 80-115.

Development of the process; factors influencing furnace design; production data. (D2, ST)

257-D. Bessemer Steel. H. W. Graham. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 116-131.

Historical sketch of the industry, the equipment used, and the techniques used in steel production. (D3, ST)

258-D. Electric Arc Furnace Steel. Walter M. Farnsworth. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 132-147.

Details on equipment design and practice; production data. (D5, ST)

259-D. Wrought Iron. Charles FonDersmith and Edward B. Story. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 148-155.

Historical outline. The operational sequence of the process. Effects of alloying elements. (D8, Fe)

260-D. Tool Steel. George A. Roberts and Charles F. Sawyer. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 358-365.

Operations in the manufacture of toolsteels include electric-furnace production, ingot production, blooming ingots to billets, annealing, forging, drawing, etc., to produce primary forms. (D5, F general, TS)

261-D. The Use of Lime, Limestone, and Dolomite in Iron and Steel Manufacture. *Edgar Allen News,* v. 30, July 1951, p. 901-903.

Illustrated survey. (D general, ST)

262-D. Modern Blast Furnace Equipment. T. H. Stayman. *Times Review of Industry,* new ser., v. 5, July 1951, p. 20-22; Aug. 1951, p. 25-26.

An illustrated review. (D1)

263-D. Steel Company of Wales Limited. *Foundry Trade Journal,* v. 91, July 26, 1951, p. 93-94.

Plant will produce 30,000 tons of steel ingots per week, from which will be rolled approximately 3500 tons of rails and railway material and 22,800 tons of sheet and plate. (D general, F23, CN)

264-D. Tool Steel; Manipulation and Heat Treatment. Alan J. Blackwell. *Iron and Steel,* v. 24, July 1951, p. 355-358; Aug. 1951, p. 387-388.

Some methods involved in the processing of the more highly alloyed types, or high speed steel. Factors involved in the production of ingots and their heat treatment. Forging is discussed in the second part. (D general, F22, J general, TS)

265-D. Pressure-Flow Relations in the Blast Furnace. (In French.) J. Szczeniowski. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 296-298.

Treated mathematically. (D1)

266-D. Kinetic Study of the Reduction of the Protoxides of Iron by Hydrogen. (In French.) J. Moreau, J. Bardolle, and J. Benard. *Revue de Métallurgie,* v. 48, June 1951, p. 486-494.

Preparation of the oxides and method of studying them, kinetics of reduction, crystalline state of reduced Fe, and micrographic study of reduction. X-ray pictures and micrographs. 13 ref. (D general, Fe)

267-D. Ladle Linings Made of Special Sands or Mixes. (In Italian.) Giuseppe Zillani. *Metallurgia Italiana,* v. 43, June 1951, p. 216-220.

Best kinds of sands for use with rammed lining material for ladles. (D9, ST)

268-D. Reactions of Chromium With Slags in the Basic Open-Hearth Furnace and Recovery of the Chromium. (In German.) Peter Bremer. *Stahl und Eisen,* v. 71, May 24, 1951, p. 575-580; June 7, 1951, p. 605-611; disc. p. 611-612.

Experiments were made to determine the effect of ferrous oxide and other substances on recovery of Cr from basic slag. 20 ref. (D2, A8, ST, Cr)

269-D. Economizing on City Gas by Supplementing the Heating of Open-Hearth Furnaces With Tar Oil. (In German.) Heinrich Clees. *Stahl und Eisen,* v. 71, June 21, 1951, p. 673-678; dis., p. 677-678.

Development and installation of gas and fuel-oil nozzles in which a sudden scarcity of gas can readily be supplemented by fuel oil. Experiments show that this arrangement reduces life of acid-furnace roof, requiring the use of basic and special checker brick. (D2, ST)

270-D. Comparison Between Brick-Lined and Rammed Ladles in Pouring Openhearth Steel. (In German.) Wolfgang Schleicher. *Stahl und Eisen,* v. 71, July 5, 1951, p. 788.

Rammed ladles cause higher con-

sumption of refractories, but they also have better durability. (D9, D2)

271-D. The Possibility of the Direct and Simultaneous Production of Coal Gas and Iron. (In German.) H. Koppenberg and W. Wenzel. *Brennstoff-Wärme-Kraft*, v. 3, July 1951, p. 217-219.

Process involves generation of coal gas and smelting of iron with a change of coal and iron ore in a low-stack blast furnace. Advantages are enumerated; disadvantages are shown to be based on uncertain price of, and demand for, gas. (D8, Fe)

272-D. Effect of Air Temperature on Heat Time. *Metal Progress*, v. 60, Aug. 1951, p. 124, 126. (Condensed from "Significance of Air Temperature in Open Hearth Operation", John S. Marsh, *American Iron and Steel Institute*, Preprint, 1951.)

Previously abstracted from original. See item 175-D, 1951. (D2, S16, ST)

273-D. Specifications for Open Hearth Charge Oxides. *American Iron and Steel Institute*, Contributions to the Metallurgy of Steel, No. 36, Aug. 1950, 29 pages.

The Technical Committee on Open Hearth Steelmaking appointed a subcommittee to survey quality requirements of openhearth oxides and write specifications. The subcommittee prepared and distributed a tentative specification based on limited experience and data, including a questionnaire covering performance and properties of various types of charge oxides. Reviews responses to the questionnaires. (D2, ST)

274-D. Survey of Open Hearth Alloy Steel Off-Heats and Residual Elements. *American Iron and Steel Institute*, Contributions to the Metallurgy of Steel, No. 35, Sept. 1949, 23 pages.

Consists entirely of tabular and graphical data. (D2, ST)

275-D. Ford Motor Company Rounds Out Steel Plant Operating Units for Balanced Production. Charles Longenecker. *Blast Furnace and Steel Plant*, v. 39, Aug. 1951, p. 926-957.

Comprehensive illustrated description of Ford Motor Co.'s steel plant at River Rouge. Separate sections describe the coke plant, blast furnaces, electric furnaces, openhearth furnaces, rolling mills, and power station. (D general, F23, ST)

276-D. High Iron Ore Charges in Cold Metal Open Hearth Furnace Heats. *Industrial Heating*, v. 18, Aug. 1951, p. 1416, 1418. (Condensed from paper by H. M. Parker.)

Deals with the practice of charging ore in cold metal heats to obtain a reasonable melt carbon with above normal percentages of iron. (D2, Fe, ST)

277-D. Use of Periclase Brick in Basic-Lined Open Hearth Furnace. R. G. Wells and L. H. Van Vlack. *Industrial Heating*, v. 18, Aug. 1951, p. 1460.

Previously abstracted from original article in the *Journal of the American Ceramic Society*. See item 31-D, 1951. (D2, ST)

278-D. The Use of Oxygen in Steelmaking. D. J. O. Brandt. *Journal of the Birmingham Metallurgical Society*, v. 31, June 1951, p. 44-60.

Use for various types of steels. Other proposals previously put forward. (D general, ST)

279-D. Low Alumina Silica Bricks for Open-Hearth Furnace Roofs. *Refractories Journal*, v. 27, July 1951, p. 273-276.

Summarizes proceedings of symposium as follows: "Raw Materials," W. Davies; "Manufacture" T. R. Lynam, A. Nicholson, and P. F. Young; "Properties and Performance," J. Mackenzie and "General Summary and Conclusions," J. H. Chesters. (D2, ST)

280-D. Trials of Refractories in Steel Plants. F. E. Pluck. *Refractories Journal*, v. 27, July 1951, p. 277-278. (D general, ST)

281-D. Iron Ore Smelting Problems (1950 Edward deMille Campbell Memorial Lecture). E. C. Smith. *Transactions of American Society for Metals*, v. 43, 1951, p. 651-691.

See abstract of condensed version in *Metal Progress*, item 312-D, 1950. (D1, Fe)

282-D. "Iscor" Works at Vanderbijl Park. *Engineer*, v. 192, Aug. 31, 1951, p. 281-284.

The new steel works of the South African Iron and Steel Industrial Corp., Ltd. Coke-oven, by-products plant, blast furnace, steelmelting, and rolling-mill plants. (D general, F23, ST)

283-D. Future Trends in the British Iron and Steel Industry. Charles Goodeve. *Fourth Empire Mining and Metallurgical Congress, Proceedings*, 1950, p. 881-904; disc., p. 1047-1093.

Mining and ore-preparation methods, blast-furnace design and operation, steelmaking, steel casting, and developments in alloy steels. 16 ref. (D general, B general, ST, AY)

284-D. Effect of Automatic Controls on Open Hearth Production at Lackawanna. R. M. Jordan. *Iron and Steel Engineer*, v. 28, Aug. 1951, p. 63-66.

Automatic combustion controls and automatic reversal offer a

means of obtaining more efficient openhearth operation after other ills have been corrected. (D2, S18, ST)

285-D. The Use of Oxygen/Carbon Dioxide Instead of Air in the Final Stage of the Basic Bessemer Process. Bo Kalling, Folke Johansson, and Lennart Lindskog. *Journal of the Iron and Steel Institute*, v. 168, Aug. 1951, p. 337-343.

Results of a number of experimental blows in a 14-ton basic bessemer converter at Domnarfvet Iron Works, in which the charges were dephosphorized with O_2/CO_2 instead of air in order to reduce the nitrogen content of the product. Advantage of the final blowing with O_2/CO_2 was that the pouring temperature could be adjusted to whatever was most suitable for the mode of pouring and the quality of the steel. By using more than about 50% oxygen in the gas mixture, more scrap could be remelted during the blow. If pure CO_2 was used for the final blow, iron losses in the slag could be reduced. 20 ref. (D3, ST)

286-D. Production of High-Purity Iron and Iron Alloys on a 25-lb. Scale. B. E. Hopkins, G. C. H. Jenkins, and H. E. N. Stone. **Appendix. The Determination of Impurities Within the Range 0.001-0.01% in High-Purity Iron.** H. G. Short. *Journal of Iron and Steel Institute*, v. 168, Aug. 1951, p. 377-383.

The method and equipment developed in the National Physical Laboratory to produce iron and iron alloys of high purity as 25 lb. ingots. Starting with a selected batch of Swedish iron, the purification procedure was carried out on the iron in the molten condition in two main stages: oxidation of a number of impurities and removal of the products of oxidation, and a vacuum treatment for degassing, followed by reduction of O_2 to a low level by dried H_2. 12 ref. (D8, Fe)

287-D. Resulphurization of Pig Iron With Pulverized Lime. Bo Kalling, Christer Danielsson, and Ottar Dragge. *Journal of Metals*, v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 732-738.

Previously abstracted from *Jernkontorets Annaler*. See item 241-D, 1951. (D1, Fe)

288-D. Kalling-Domnarfvet Process at Surahammar Works. Sven Fornander. *Journal of Metals*, v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 739-741.

A new process for desulfurization of hot metal from the iron blast furnace carried out at a Swedish plant. In the process, powdered burnt lime is used as a desulfurizing agent in a rotary furnace. (D1, CI)

289-D. A Corrected CO/CO_2 Ratio for Blast Furnaces. Sid T. Killian. *Journal of Metals*, v. 3, Sept. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 742-745.

Proposes as an index of blast-furnace performance the CO/CO_2 ratio of the blast-furnace gas on an H_2-free basis with the flux CO_2 deducted from the gas analysis. On iron of similar analysis, it gives a closer expression of the efficacy of the gasified carbon of the fuel in removing the oxygen from the ore. (D1, Fe)

290-D. The All-Basic Open Hearth. Part II. R. P. Heuer and M. A. Fay. *Refractories Journal*, v. 27, June 1951, p. 231-237.

Basic refractories used in openhearth roof, ports, and ends; construction of slag pockets and regenerators; and fuel practices and direct comparisons between furnaces of various design. (To be concluded.) (D2, ST)

291-D. Recent Technical Progress in Basic Steel Furnace Refractories. Part II. F. I. Cordwell. *Refractories Journal*, Aug. 1951, p. 319-322.

Facts regarding the technical melting and metallurgical advantages of the chrome-magnesite furnace. (D5, ST)

292-D. Further General Consideration With Chrome-Magnesite Steel Furnaces. *Refractories Journal*, Aug. 1951, p. 322-329.

By means of a detailed comparative cost analysis of material and labor charges for construction of a 40-ton coke-oven-gas-fired steel furnace of chrome-magnesite and silica construction, it was shown that the latter has considerable economic and technical advantages. (D2, ST)

293-D. Radioactive Tracers in Blast Furnace Exploration. *Research*, v. 4, Sept. 1951, p. 418-420.

Two interesting uses of radioactive tracers in research in the iron and steel industry were mentioned in the annual report for 1950 of the British Iron and Steel Research Association. Details of techniques employed and purposes of the experiments. Both are concerned with blast-furnace operation. (D1, S19, Fe)

294-D. Radioactive Tracers Aid Blast Furnace Research. E. W. Voice, *Steel*, v. 129, Sept. 10, 1951, p. 102, 104, 106-107.

British research techniques and apparatus. Tuyere-to-stockline gas-transit-time readings are charted. Use for measurement of refractory wear. (D1, S19, Fe)

295-D. Metals for the West; A New Open Hearth Steel Furnace. Ralph G. Paul. *Western Machinery and Steel World*, v. 42, Aug. 1951, p. 88-91, 99.

Outstanding feature of new open-hearth furnace is the method of heating. Techniques used to burn fuel at a very high temperature. (D2, ST)

296-D. Method for Rapidly Calculating the Mixing Bed of Blast Furnaces. (In French.) J. Laborne. *Métallurgie et la Construction mécanique*, v. 83, July 1951, p. 517-519.

Treated mathematically. (D1, Fe)

297-D. Production of Semihard Steel by Casting in the Basic Electric Furnace. (In Italian.) Vittorio Scalise. *Associazione Italiana di Metallurgia*, "Foundry Proceedings," Vol. II, 1948, p. 1-8.

Effect of Al on nature and distribution of nonmetallic inclusions and mechanical properties of steel, and methods for the elimination of hydrogen. 17 ref. (D5, ST)

298-D. The Problem of Ingot Molds in Steel Works. (In Italian.) Fernando Borelli. *Associazione Italiana di Metallurgia*, "Foundry Proceedings." Vol. II, 1948, p. 9-19.

Various factors such as temperature, design, chemical composition; emphasizes advantages of shortening the time the ingot is in the mold. (D9, ST)

299-D. (Book) **Fundamentals of Metallurgy.** (In Russian.) G. A. Kashchenko. 639 pages. 1949. State Publishing House for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

A methodical treatment. Russian metallurgical history and personalities. Describes and classifies the Russian stainless steels. (D general, SS)

300-D. Basic Refractories and Slag for Electric Steel Furnaces. A. H. Thomson. *American Foundryman*, v. 20, Sept. 1951, p. 52-54.

Use of acid refractories for basic roofs, spalling caused by temperature changes, and magnesite vs. dolomite. (D5, ST)

301-D. Basic Open-Hearth Furnaces. H. K. Work and H. M. Banta. *American Institute of Mining and Metallurgical Engineers*, "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 3-32.

General features of furnace construction, slag pockets and regenerators, furnace control and maintenance, and miscellaneous and auxiliary equipment. 17 ref. (D2, ST)

302-D. Survey of Open-Hearth Operations. T. S. Washburn. *American Institute of Mining and Metallurgical Engineers*, "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 33-58.

A general outline of the basic openhearth process. The discussion is limited to the sequence and purpose of the operations, illustrated by data and examples. (D2, ST)

303-D. Open-Hearth Refractories. R. B. Sosman, A. W. Robinson, and W. S. Debenham. *American Institute of Mining and Metallurgical Engineers*, "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 59-80.

Raw material used. Construction and maintenance. 11 ref. (D2)

304-D. Open-Hearth Fuels, Combustion, and Instrumentation. H. V. Flagg, R. A. Lambert, and B. M. Larsen. *American Institute of Mining and Metallurgical Engineers*, "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 81-153.

A practical discussion of the various features of open-hearth practice and instrumentation related to the efficient heating of the furnace, control of temperature, and protection of the furnace structure from accidental overheating. 24 ref. (D2, S16)

305-D. Raw Materials. T. L. Joseph, T. S. Washburn, and G. L. Plimpton. *American Institute of Mining and Metallurgical Engineers*, "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 154-189.

Raw materials of basic openhearth process that are important in determining the composition of steel or slag. They are the metallic charge, oxygen-bearing materials, fluxes, alloying and deoxidizing additions, and certain refractory materials used for maintenance of bottoms. 36 ref. (D2, B21, B22, ST)

306-D. Slag Control. W. O. Philbrook and F. M. Washburn. *American Institute of Mining and Metallurgical Engineers*, "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 190-254.

Techniques and methods. Calculation of slag weight and slag analysis. Objectives and limitations of slag control. 39 ref. (D2, ST)

307-D. Charging and Melting Practice. Michael Tenenbaum, W. O. Phil-

brook, and F. M. Washburn. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 255-293.

General and specific charging and melting practices. 13 ref. (D2, ST)

308-D. Refining Practice. W. O. Philbrook, Michael Tenenbaum, and F. M. Washburn. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 294-338.

Shaping slag; oreing practice; decarbonization by oxygen injection; control of bath composition and temperature; fuel, air, and draft practice; and duplex practice. 23 ref. (D2, ST)

309-D. Finishing and Deoxidation Practice. H. Ross and R. K. Kulp. *American Institute of Mining and Metallurgical Engineers.* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 339-393.

Different types of ingot structures and finishing operations of the refining. Illustrates actual basic openhearth practice by including four heat logs. 19 ref. (D2, D9, ST)

310-D. Molds and Pouring Practice. H. J. Forsyth and L. G. Ekholm. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 394-433.

Mold design, types of molds, and pouring practice. 14 ref. (D9, ST)

311-D. Ingot Structure and Segregation. James W. Halley. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 434-458.

Ingot structures of killed, semikilled, and rimmed steels and processes of solidification leading to them. 13 ref. (D9, M27, ST)

312-D. Nonmetallic Inclusions. C. E. Sims. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 459-489.

Nature and constitution, origin, cleanness, and detection of nonmetallic inclusions in steel. 30 ref. (D9, M27, ST)

313-D. Physical Chemistry of Slag-Metal Reactions. Gerhard Derge and Michael Tenenbaum. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 691-748.

Attempts to indicate the present state of knowledge regarding the constitution of basic slags. Two general concepts of slag constitution—molecular association hypothesis and ionization concept—have been developed and both have met with some success. 41 ref. (D2, P12, ST)

314-D. Physical Chemistry of Open-Hearth Refractories. R. B. Sosman. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 749-772.

Physics and chemistry of the individual refractory materials, and the causes of faliure of open-hearth refractories. 17 ref. (D2)

315-D. Thermal Changes in Melting and Refining. Lawrence S. Darken. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 773-794.

Calculation of thermal effects of additions to bath and the heat balance of metallurgical reactions. (D2, P, ST)

316-D. Gas Flow and Heat Transfer. B. M. Larsen. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 795-834.

An introduction to the problems of flow of gases through the furnace system and the flow of heat in this system. Some of the conditions of heat and gas flow peculiar to the openhearth. 11 ref. (D2, ST)

317-D. Furnace Efficiency and Available Heat From Fuel. B. M. Larsen. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 835-866.

Deals with the heat quantities involved in openhearth steelmaking, including thermal efficiency of the furnace as a generator of high-temperature heat, heat storage in the steel and slag produced and in the furnace walls, and heats of the various chemical reactions involved in combustion, in formation of slag, and refining of steel. (D2, ST)

318-D. Rates of Open-Hearth Reactions. B. M. Larsen. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 867-905.

Rates of reactions at high temperatures, the oxidation of C, Si, and Mn, and the reactions in finishing the heat. (D2, ST)

319-D. Practical Aspects of Duplexing. E. Kay. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Aug. 1951, p. 33-36; disc., p. 36-37.

Three methods of duplexing cupola metal, in the rotary furnace, air furnace, and electric furnace. Advantages of the rotary furnace used in the author's plant. Use of acid-hearth reverberatory-type air furnaces and electric furnaces as duplexing units. (D7, E10, CI)

320-D. Measurement and Control in the Utilization of Mixed Fuels and Oxygen in Open-Hearth Furnaces. Martin J. Conway and Edward H. Cauger. *Instruments,* v. 24, Sept. 1951, p. 1028-1034.

Instrumentation and combustion techniques which have made it possible for openhearths designed for 60-ton heats to produce heats of 170 tons with reduced fuel consumption per ton and increased checker life. Fuel temperature, viscosity, and flow are controlled, as are furnace pressure, oxygen flow, and air flow. (D2, S18, ST)

321-D. Continuous Steel Casting Pilot Plant Proves Successful. D. I. Brown. *Iron Age,* v. 168, Sept. 20, 1951, p. 113-118.

Rounds up to 7 in. diam. and slabs up to 3x15 in. are now being continuously cast and used as semifinished products to feed conventional rolling mills. Carbon and stainless steels were cast with equal success. (D9, CN, SS)

322-D. Blast Furnace Inwall Rebuilt at Algoma. D. Joyce and J. Laidlow. *Iron and Steel Engineer,* v. 28, Sept. 1951, p. 75-80; disc., p. 80.

How the inwall of a furnace was replaced without removing the stockline section. (D1, Fe)

323-D. Effect of the Composition of Minerals on Their Use in Blast Furnaces. (In French.) J. Laborne. *Métallugie et la Construction Mécanique,* v. 83, Aug. 1951, p. 573-577.

Studies mathematically the proper proportions of SiO_2 and CaO in slag for blast-furnace operations. (D1, Fe)

324-D. British Report on All-Basic Openhearths. Max Davies. *Iron Age,* v. 168, Oct. 4, 1951, p. 225-228.

Six furnaces in the United Kingdom and Holland which have completed five campaigns. Indicated advantages include: increased output, reduced man-hours for brick laying, less slag bulk, reduction in shutdown time and the most advantageous use of liquid fuels. Built-in pressure indicators help with design and construction. (D2)

325-D. Increasing Bessemer Production. *Metal Progress,* v. 60, Sept. 1951, p. 130, 132, 134. (Condensed from "Oxygen as a Means of Increasing Bessemer Production," W. G. McDonough.

Previously abstracted from *American Iron and Steel Institute,* Preprint, 1951. See item 176-D, 1951. (D3, ST)

326-D. Gas Velocity Faster in Blast Furnace Stock Columns. S. P. Kinney. *Steel,* v. 129, Oct. 1951, p. 87.

Observations were made on a column of stock consisting of ore, coke and stove. Calculations to determine the free area of the stock on a given plane. (D1, Fe)

327-D. Oxygen as a Means of Increasing Bessemer Production. I. W. G. McDonough. *Industrial Heating,* v. 18, Sept. 1951, p. 1595-1596, 1598, 1600, 1602, 1680.

Bessemer plant layout and operation at National Works Plant, McKeesport, Pa., as well as the oxygen plant and piping system. Experimental oxygen blows, varying oxygen volume, rate of flow and time of input. (To be continued.) (D3, B22, ST)

328-D. A New Process for Direct Reduction of Iron Pyrites. Antonio Scortecci and Massimo Scortecci. *Metal Progress,* v. 60, Oct. 1951, p. 72-75.

Process based on the dissociation of pyrites in the absence of air, and in the presence of C, with the formation of Fe and CS_2. The S content of the pig iron so obtained can be kept at low and technically acceptable values by methods dictated by economic conditions. Practically all the iron present is recovered as pig iron. The CS_2, recovered from small-scale tests, contains as much as 60% of the original S. Chemical reactions, power requirements, and industrial possibilities. (D8, Fe)

329-D. Bessemer Steel Low in Nitrogen and Phosphorus. Pierre Coheur. *Metal Progress,* v. 60, Oct. 1951, p. 78-80.

Development of a satisfactory process for the above by several Belgian organizations. The metal is blown with oxygen-enriched air or other gases. The development work included experiments with the converters themselves, extensive chemical analysis and physical tests of the steels produced, and a statistical study on more than 400 test blows. (D3, ST)

330-D. Effect of Sinter on Blast Furnace Production. *Metal Progress,* v. 60, Oct. 1951, p. 162, 164, 166. (Condensed from "The Effect of Sinter on Blast Furnace Production as Determined by Analysis of Daily Operating Data," W. E. Marshall.)

Previously abstracted from *American Iron and Steel Institute,* Preprint, 1951. See items 177-D and 209-D, 1951. (D1, Fe)

331-D. Instruments in Steel Making. Dr. A. H. Leckie. *Times Review of Industry,* v. 5, Oct. 1951, p. 22-24.

Includes diagrams on typical panels for openhearth furnaces. (D2, S16, S18)

332-D. Effect of Form and Care on the Life of Steel Mill Chill Molds. (In

German.) Erich Folkhard. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben,* v. 96, Aug. 1951, p. 169-172.

Graphs show results of systematic study. 10 ref. (D9, ST)

333-D. (Book) **Basic Open Hearth Steelmaking. Ed. 2.** W. O. Philbrook and M. B. Bever, editors, 940 pages, 1951. American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y. $8.00.

Presents the text under two main headings: practice and principles. The chapters under each are abstracted separately. (D2, ST)

334-D. Oxygen Lancing in Electric Arc Steelmaking Furnaces. *Engineer,* v. 192, Oct. 5, 1951, p. 426-428.

Summarizes proceedings of recent British conference organized by British Iron and Steel Research Assoc. (D5, ST)

335-D. Open Hearth and Electric Furnace Refractories. James R. Cady. *Refractories Journal,* v. 27, Sept. 1951, p. 371-376.

Previously abstracted from *Blast Furnace and Steel Plant.* See item 210-D, 1951. (D2, D5, ST)

336-D. Use of Oxygen for Decarburizing Electric Furnace Steels. (In Italian.) Marcel Michaud. *Metallurgia Italiana,* v. 43, Aug. 1951, p. 315-322.

Advantages and methods for introduction of the oxygen into the furnace. Results obtained to date in making ordinary and special steels. Economics of the process. 12 ref. (D5, B22, ST)

337-D. Slag Materials and Slag Action in Basic Arc Furnaces. C. B. Post and D. G. Schoffstall. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 18-22; disc., p. 22-29.

Standard lime, fluorspar, and silica as slag-making materials in the basic electric-arc furnace. Requirements for reducing slag in the basic arc furnace. (D5, B21, ST)

338-D. Continuous Casting. Isaac Harter, Jr. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 31-42; disc., p. 42-48.

Developments and modern practices. Basic requirements for casting steel. (D9, ST)

339-D. Bottom Building and Maintenance. H. C. Bigge. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 49-67; disc., p. 67-69.

Methods used by several large producers of steel. Performance data on various furnace bottoms. (D5, ST)

340-D. Top Charging and High Voltages in Lining Life and Repair. R. J. McCurdy. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 70-71; disc., p. 71.

Factors involved. (D5, ST)

341-D. Types of Roof Construction. T. A. Blackwell. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 72-74; disc., p. 74-75.

See abstract of "Electric Furnace Roof Refractories", *Journal of Metals;* item 35-D, 1951. (D5)

342-D. Relining Electric Furnaces. C. F. Staley. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 76-77; disc., p. 77.

Procedures. (D5, ST)

343-D. Control of Refractory Materials. C. E. Sumpter. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 77-79; disc., p. 79.

Materials used in the various parts of a furnace, and methods of checking and controlling the quality. Results of recent trials at South Works, Carnegie-Illinois Steel Corp. (D5, ST)

344-D. Application of Resistance Indicator to Electric-Arc Furnaces. Alex Sherman. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 80-89; disc., p. 89-90.

Most electrical resistances present in the electric-arc furnace represent only a source of waste of energy. How to recognize and reduce this waste. A resistance-indicator apparatus and its advantages. (D5, ST)

345-D. Some Observations on the Metallurgy of Electric-Furnace Melting. C. R. Taylor. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 91-97; disc., p. 97-98.

Data on the inclusion content of steel are graphed. (D5, ST)

346-D. Practical Aspects of Tool-steel Melting. Charles F. Sawyer, Jr. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 98-100; disc., p. 100-103.

Previously abstracted from *Journal of Metals.* See item 325-D, 1950. (D5, ST)

347-D. Production of Alloy Steel in Large Basic Furnaces. A. K. Blough. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 104-109; disc., p. 109-111.

Previously abstracted from *Journal of Metals.* See item 24-D, 1951. (D5, AY)

348-D. Rimmed and Semikilled Steels. Paul Lindberg. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 112-113; disc., p. 113-115.

Practices used by McLouth Steel Corp. (D5, ST)

349-D. Induction Melting of Stainless Steels. R. J. Wilcox. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 115-118; disc., p. 118-119.

Use of induction furnaces in the production of special steels. Procedure for making an 18-8 (type 304) heat. (D5, SS)

350-D. Recent Trends in Stainless Melting Practice. A. C. Ogan. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 120-122; disc., p. 122-124.

Increased production; improving the quality of stainless; and pouring methods. (D5, SS)

351-D. Ore Practice in an Acid Electric Furnace. Frank J. Stanley. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 125-127; disc., p. 127-129.

As used by McConway and Torley Corp., Pittsburgh. Data were taken during the production of a series of 17 heats. (D5, ST)

352-D. Ore Practice in Making Acid Electric Steel. W. L. Doyle. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 130-131; disc., p. 131-134.

Practices used at Fort Pitt steel foundry at McKeesport, Pa. Data on heats are tabulated. (D5, ST)

353-D. Oxidation Period in Oxygen Injection in Melting Acid Electric Steel. R. H. Jacoby, M. Petty, and J. Mitchell. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 135-137; disc., p. 137-139.

Technique for carbon steel and alloy steels containing 1% Cr, 0.5% Mo; 2% Cr, 0.5% Mo; and 5% Cr, 0.5% Mo; respectively. (D5, CN, AY)

354-D. Oxygen Practice at Oklahoma Steel Castings Company. J. H. Garrison. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 140-143; disc., p. 143-148.

See abstract of "Oxygen in Acid Electric Steel Production," *Journal of Metals;* item 246-D, 1951. (D5, ST)

355-D. Investigation of New Special Deoxidizers. G. G. Mickelson. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 149-156; disc., p. 156-158.

Use of Se, Graphidox, Si-Mg-Al, and Na as deoxidizers for steel. Mechanical properties with and without deoxidizers. (D5, Q general, ST)

356-D. Effect of Various Types of Final Deoxidizers on Physical Properties of Class B Cast Steel. Clyde Wyman. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 159-172; disc., p. 172-174.

Purpose of investigation was to find a final deoxidizer that would produce a steel having the highest possible quality. Micrographs show results obtained with 10 types of deoxidizers. (D5, M27, Q general, ST)

357-D. Steels Deoxidized With Silicon. J. A. Bowers. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 174-179; disc., p. 180.

Effects of various additions. Mechanical properties are tabulated. (D5, Q general, ST)

358-D. Deoxidizing in the Ladle With Carbortam. W. O. Ingelman and D. A. Finch. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 180-185; disc., p. 185-190.

Previously abstracted from *Journal of Metals.* See item 326-D, 1950. (D5, B22, ST)

359-D. Rating Inclusion Structures in Cast Steels and Their Effects on Tensile Properties. Edward A. Loria. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 191-203; disc., p. 203-209.

A study on such deoxidizers as Ca-Si, SiC and Ca-Mn-Si, when used singly or in combination with Al. The effect of these oxidizers on the nature and distribution of inclusions and the resultant tensile properties. (D5, M27, Q27, ST)

360-D. Production Control of Molten Steel Temperature and Its Effect on Steel Casting Quality. Charles A. Faist. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 210-228; disc., p. 228-244.

A relationship between temperatures of the bath and that of the test spoon of steel is shown to exist. Data on pouring and ladle preheat cycles. Some notes on proper temperature control equipment. (D9, S16, ST)

361-D. Residuals. J. S. Marsh. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 245-250.

Residuals are the elements ordinarily present in steel in small quantities without definite intent on the part of the steelmaker. Their behavior is discussed on a physical chemistry basis. Possible methods for removal or control. (D5, P12, ST)

362-D. Progress in Electric Steelmaking. C. F. Hood. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 253-260.

A survey. Uses of steels in various fields. (D5, T general, ST)

363-D. The Axial Compressor for Blast Furnace Blowing. W. O. Lowell. *Iron and Steel Engineer,* v. 28, Oct. 1951, p. 64-70.

Compared with the standard centrifugal blower. Advantages are an over-all efficiency improvement of 14-16%. (D1, Fe)

364-D. Low Sulphur Steel From High Sulphur Raw Materials and Fuel. F. L. Robertson, C. H. Bacon, and J. W. Till. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1031-1043; disc., p. 1043-1044.

Development of a process for making low-sulphur steel in furnaces fired with 2½% sulfur oil. Slag and metal are analyzed at melt. Slag weight is estimated. A simple method for calculating necessary lime additions for making 0.025 and 0.035% S steel is given. (D2, ST)

365-D. Effects of Manganese and Its Oxide on Desulphurization by Blast-Furnace Type Slags. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1048-1049.

Discussion of above paper (by Nicholas J. Grant, Ulf Kaling, and John Chipman). (Aug. 1951 issue, see item 248-D, 1951.) (D1, B21, CI)

366-D. Effect of Silica Reduction on the Desulphurizing Power of Blast-Furnace Type Slags. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1049-1050.

Discussion of above paper (by Nicholas J. Grant, Olaf Troili, and John Chipman). (Aug. 1951 issue, see item 249-D, 1951.) (D1, B21, CI)

367-D. Distribution of Sulphur Between Liquid Iron and Slags of Low Iron-Oxide Concentrations. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1050-1051.

Discussion of paper (by R. Rocca, N. J. Grant, and J. Chipman). (Apr. 1951 issue, see item 133-D, 1951.) (D general, Fe, ST)

368-D. Desulphurization of Pig Iron With Pulverized Lime; Kalling-Domnarfvet Process at Surahammar Works. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191. 1951, p. 1052-1053.

Discussion of above two papers (by Bo Kalling, C. Danielsson, and Ottar Dragge; and Sven Fornander, respectively.) (Sept. 1951 issue, see items 287-D and 288-D, 1951.) (D1, CI, Fe)

369-D. Solution Loss and Reducing Power of Blast Furnace Gas. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1053-1054.

Discussion of above paper (by T. L. Joseph). (Jan. 1951 issue, see item 25-D, 1951.) (D1, Fe)

370-D. Oxygen in Liquid Open-Hearth Steel—Oxidation During Tapping and Ladle Filling. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1054-1055.

Discussion of above paper (by T. E. Brower, J. W. Bain, and B. M. Larsen). (June 1950 issue, see item 183-D, 1950.) (D2, D9, ST)

371-D. Metals for the West: Big Steel in the Mountains. R. G. Paul. *Western Machinery and Steel World,* v. 42, Oct. 1951, p. 94-97.

U. S. Steel's Geneva steel mill near Provo, Utah. Coke plant, blast furnaces, openhearths, and rolling mills. (D general, F23, ST)

372-D. Carbon, Phosphorus and Sulfur Distribution in a Rimming Openhearth Steel Ingot, Containing 0.15% Carbon. (In Czech.) Vaclav Rauner. *Hutnické Listy,* v. 6, Aug. 1951, p. 376-380.

The chemical composition difference between an average melt sample and finished-product samples at various points of a semiduplex openhearth rimming steel ingot containing 0.15% C and cast into square, hot-topped, big-end-up and normal molds. The range and the scatter value should be considered in all cases where a high degree of homogeneity is required in order to determine the most suitable ingot portion for production of serviceable product. (D9, D2, ST)

373-D. Discussion of the Problem of Constructing an Openhearth Furnace for a Special Case. (In French.) *Circulaire d'Informations Techniques,* No. 9, 1951, p. 1037-1041.

A furnace of 75-100 tons capacity is proposed. Construction details, such as dimensions, burners, flues, chambers, and stacks. (D2, ST)

374-D. Modern Auxiliary Equipment for the Openhearth. (In French.) M. Labat. *Circulaire d'Informations Techniques,* No. 9, 1951, p. 1046-1051.

New types of reversing valves, cooled furnace doors, burners, charging equipment, etc. (D2, ST)

375-D. Ways of Using the Burners on Openhearth Furnaces. (In French.) M. Godenne. *Circulaire d'Informations Techniques,* No. 9, 1951, p. 1052-1056.

Possibilities for avoiding the attack of basic dust on the masonry separating the air duct from the gas duct. Silica and silica-magnesia burners; also the Maerz and Leckie-Maerz furnaces, the latter incorporating important modifications for elimination of dust difficulties. (D2, ST)

376-D. Regulation of Basic Bessemer Converters With Constant Air Flow. (In French.) Paul Thierry. *Revue de Métallurgie,* v. 48, Aug. 1951, p. 619-629; disc., p. 630.

Desirable properties of steel from converters; conditions necessary to produce such cast iron; and regulation of the converter for optimum results. (D3, ST)

377-D. The Slag-Reaction Process for Producing Steel by the Openhearth Process. (In German.) Edgar Spetzler. *Archiv für das Eisenhüttenwesen,* v. 22, July-Aug. 1951, p. 197-204.

Individual examples show the different possibilities of producing substitutes for electric furnace steels with the aid of slag reduction in the openhearth furnace. 15 ref. (D2, ST)

378-D. Large-Scale Method of Raising Output in Electric Steel Foundries. (In German.) W. Trommer. *Giesserei,* v. 38 (new ser., v. 4), Sept. 6, 1951, p. 422-426.

Experiments made in a 3-ton electric arc furnace show that the output can be increased 1.6 times by increasing the charge. By changing the dimensions of the hearth chamber, current and electrode consumption can be reduced. However, increase in output above 1.34 times reduces the quality of the steel. 11 ref. (D5, ST)

379-D. Desulfurization in the Cupola and in Electric Furnaces. (In German.) C. W. Pfannenschmidt. *Giesserei,* v. 38 (new ser., v. 4), Sept. 20, 1951, p. 459-469.

General methods of desulfurizing molten cast iron, such as by using basic linings, suitable slags, or by addition of Mn compounds or alloys. Various improved desulfurizing methods. (D5, E10, CI)

380-D. Heat Losses in Steel Mills by Type, Quantity, and Importance. (In German.) Kurt E. Poppe. *Stahl und Eisen,* v. 71, July 19, 1951, p. 769-773.

Tabular analyses for openhearths, gas producers, heating ovens, etc. Includes economic analysis and recommendations for minimizing such losses. (D general, ST)

381-D. Determination of Coke Consumption of Blast Furnaces. (In German.) Friedrich Wesemann. *Stahl und Eisen,* v. 71, Aug. 16, 1951, p. 873-877.

A simplified method of determination. The mathematical process is clarified by tables and graphs. (D1, Fe)

382-D. Results of Blast-Furnace Operation Using a Low Charge Level of Fine-Grained Material. (In German.) Wilhelm Wolf. *Stahl und Eisen,* v. 71, Aug. 30, 1951, p. 922-925.

How the difficulties of smelting low-grade ore are overcome by diminishing the size of the furnace charge. (D1, Fe)

383-D. Flow and Thermotechnical Evaluation of Blast-Furnace Stoves. (In German.) Michael Hansen. *Stahl und Eisen,* v. 71, Aug. 30, 1951, p. 941-946.

Comprehensive analysis of design factors, including checkerwork, hood space, combustion chamber, and burner design. (D1)

384-D. Principles of Desulfurization in the Production of Basic Openhearth Steels. (In German.) Friedrich Harders, Hubert Grewe, and Willy Oelsen. *Stahl und Eisen,* v. 71, Sept. 13, 1951, p. 973-985; disc., p. 985-986.

Plant and laboratory experiments made on 25 melts. Factors that determine the S content of the steel. 16 ref. (D2, ST)

385-D. Blast-Furnace Observations With a Measuring "Sword". (In German.) Wilhelm Wolf. *Stahl und Eisen,* v. 71, Sept. 13, 1951, p. 986-991.

Apparatus and procedure for recording simultaneously both temperature and gas composition across the furnace. Charted results point to important conclusions concerning cause of the scaffolding phenomenon, and concerning furnace and charge-distribution design. (D1, S16, S18, Fe)

386-D. Determination of the Chemical Effect of Carbon in Molten Iron. (In German.) Wilhelm Wenmann and Theo Kootz. *Stahl und Eisen,* v. 71, Sept. 13, 1951, p. 992-994; disc., p. 994.

Experiments show that the oxide films formed on the surface of molten pig iron disappear at and above the ignition temperature of carbon and that increasing C content lowers, while increasing Si content raises, this ignition point. 11 ref. (D1, Fe)

387-D. Performance Data on Electric Furnaces Melting Basic Bessemer Steel. (In German.) Friedrich Badenheuer and Hans Schweiger. *Stahl und Eisen,* v. 71, Sept. 27, 1951, p. 1029-1035.

Results of a study of large electric-arc furnaces in each of 12 mills for a period of one month. As a result considerable increases in output rate were achieved. Use of a "stirring coil" was found to be the most promising method of further reducing the refining time. 20 ref. (D5, ST)

388-D. Specific Charge Rates of Blast Furnaces of Different Capacity. (In German.) Wilhelm Wolf. *Stahl und Eisen,* v. 71, Sept. 27, 1951, p. 1035-1037.

In a German plant, it was found that increasing the coke charge rate increases the coke consumption per ton of pig iron. Comparative data from different countries indicate a drop in hearth charge with increasing hearth diameter. (D1, Fe)

389-D. Alloys With Sulfur in Metallurgy, Metallography, and Cosmic Physics. (In German.) Rudolf Vogel. *Zeitschrift für Metallkunde,* v. 42, July 1951, p. 202-206.

Several examples explain the importance of research on equilibria between metal and rock to production of sulfur-containing steels, to explanation of meteorite structure,

and to determination of composition of stellar matter. (D general, ST)

390-D. Diffusion Deoxidation With Coke in the Basic Openhearth Furnace. (In Polish.) K. Radzwicke and J. Kozielski. *Prace Glownego Instytutu Metalurgii*, v. 3, No. 4, 1951, p. 267-277.

Mechanical properties of openhearth steel are said to be inferior to those of electric-furnace steels because of greater content of oxygen and nonmetallic inclusions. Application of diffusion deoxidation with coke to eliminate the difference in quality. Other advantages. (D2, ST)

391-D. Influence of Productive Factors on Properties of Transformer Sheets Rolled at High Temperatures. (In Polish.) M. Markuszewica and J. Kozielski. *Prace Glownego Instytutu Metalurgii*, v. 3, No. 4, 1951, p. 279-295.

Reviews present opinions concerning influence of chemical composition, structure, and tension on magnetic properties. Results of application of different melting methods to 35 melts. Optimum procedures for melting and heat treatment. Typical structures are illustrated. 22 ref. (D general, F23, P16, SG-p)

392-D. Sintering of Iron Ores and Production of Bessemer Steel With Vegetable Charcoals in Brazil. (In Portuguese.) Jayme Benedito de Araujo. *Engenharia, Mineracao e Metalurgia*, v. 16, May-June 1951, p. 19-21.

Investigation of the mineral content of charcoals from various parts of Brazil and their application in the production of bessemer steel. (D3, B16, ST)

393-D. Low-Shaft Iron Smelting Furnaces. D. J. O. Brandt. *Coke and Gas*, v. 13, Oct. 1951, p. 351-356, 364.

The latest developments in the production of pig iron with fuels other than metallurgical coke. (D1, Fe)

394-D. Trends of Iron and Steelmaking Processes. (In Swedish.) Bo Kalling. *Jernkontorets Annaler*, v. 135, No. 7, 1951, p. 241-284, disc., p. 285-286.

On the basis of a survey of progress of iron and steelmaking processes during the past 10-15 years, an attempt is made to forecast future developments. 14 ref. (D general, Fe, ST)

395-D. (Book) **Austenitic Grain-Size Control of Steel.** B. R. Nijhawan and A. B. Chatterjee. 58 pages. 1951, Council of Scientific & Industrial Research, New Delhi, India. Rs 3.

A comparative study of methods for revealing the mechanism of grain-size control. Properties of a large number of commercial steels of foreign and Indian make were studied and correlated with grain-size. (D general, M27, ST)

396-D. (Book) **Elektrometallurgiya; Obshchii Kurs.** (Electrometallurgy; General Course.) F. P. Edneral. 552 pages. 1950. State Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

Equipment and procedures for electric steelmaking. The last section covers production of ferro-alloys in general and specifically for each type. 118 ref. (D5, B22, ST, Fe-n)

SECTION E

FOUNDRY

1-E. Cupola Practice. S. Geigenbaum. *Metal Progress,* v. 58, Dec. 1950, p. 916, 918, 920, 922.

Reviews several recent articles from *British Cast Iron Research Association Journal of Research and Development.* Main topics are water-cooled cupolas, oxygen enrichment, and hot-blast cupolas. (E10, CI)

2-E. Basic Principles of Die Design; Disposition of the Die Cavity; The Use of Loose Die Inserts. H. K. Barton and L. C. Barton. *Machinery* (London), v. 77, Nov. 30, 1950, p. 568-574.

Refers to die casting. Clarified by diagrams. (E13)

3-E. Massive Steel Castings; Production at the Parkhead Works of William Beardmore & Company, Limited. A. R. Parkes. *Foundry Trade Journal,* v. 89, Nov. 30, 1950, p. 439-447.

(E11, CI)

4-E. Desulfurization of Cast Iron by Sodium Carbonate. (In French.) Jean Guillamon. *Fonderie,* Sept. 1950, p. 2186-2187.

Three methods used in the French casting industry. Optimum conditions for each of the methods. (EE, CI)

5-E. Development and Present Status of Binders for Molding Cores. (In French.) Pierre Nicolas. *Fonderie,* Oct. 1950, p. 2209-2215.

Methods and results of testing various binders as substitutes for linseed oil, the price of which reached prohibitive levels in France. A product designated as "Aglofran" is said to give satisfactory results. (E18)

6-E. Control of Gas Content in Light-Alloy Melts. (In French.) Gustave Caminade. *Fonderie,* Oct. 1950, p. 2220-2221.

Three practical methods and optimum conditions of operation for each method. (E25, Al)

7-E. Operational Difficulties in Foundries and Metallurgical Plants. (In German.) E. R. Thews. *Neue Giesserei,* v. 37 (new ser., v. 3), Nov. 2, 1950, p. 499-500.

Means of preventing the gasification of metals in crucibles and precautions to be observed in the melting of brasses. (E10)

8-E. Determination of Moisture Content of Molding Materials. (In Czech.) Ladislav Jenicek. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 12-20.

A new method and apparatus which secures improved contact of the sample with the carbon crucible, hence more accurate results. (E18)

9-E. Technological Evaluation of Clay Binders and Sands Used for Green Sand Casting. (In Czech.) Lev Petrzela. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 21-43.

Derives mathematical expression for the relationship of compression strength, moisture content, permeability, and binder content. Data for 20 kaolinitic and montmorillonitic samples. (E18)

10-E. Research on Nodular Cast Iron. (In Czech.) Jan Plachy and Jan Chenicek. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 44-49.

Experiments using different metals as nodulizing agents. Addition of Mg alloy below the melt level and inoculation before addition give satisfactory results. Further research is aimed at substitution for Cu and Ni of other more readily available metals. (E25, CI)

11-E. Controlling the Shape of Graphite in Cast Iron. (In Czech.) Nikolaj Chvorinov. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 50-57.

Results of experiments. The strongest influences on the type of graphitization appear to be the amounts of dissolved S and O_2. (E25, CI)

12-E. Centrifugal Casting and Its Problems. (In Czech.) Vaclav Koutecky. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 57-61.

Procedures and equipment. Economic and technological factors. Claims that improvement in mechanical properties results for alloy steels, but not for carbon steels. (E14, CI)

13-E. Casting of Nonferrous Metal Ingots. (In Czech.) F. Kralik, *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 98-102.

Current casting methods, especially those used for casting Al and Cu. Detailed analysis of ingot defects. (E general, Al, Cu)

14-E. Flow Studies Develop Better Gating. *American Foundryman,* v. 18, Dec. 1950, p. 28-31.

Selected shots from a film produced at Battelle Memorial Institute on flow during pouring of Al and Mg castings. Transparent plastic molds and water (which has a kinematic viscosity similar to that of molten Al and Mg) are used in the research. New ideas in gating and confirmation of existing practices which have resulted from the work. (E22, Al, Mg)

15-E. Modern Foundry Methods: Cylinder Block Cleaning at Ford Motor Co. *American Foundryman,* v. 18, Dec. 1950, p. 42-45.

Includes knockout, external and internal shot blasting, shakeout, chipping, and pressure testing, as applied to cylinder blocks. (E24, L10, CI)

16-E. Core Sag Controlled. Tom Barlow. *American Foundryman,* v. 18, Dec. 1950, p. 57-60.

Use of southern bentonite to control the impact properties of green cores has resulted in reduction in number of cores scrapped for sag and distortion; in number of broken cores; in number of wires required per core; and, in rare cases, elimination of core driers. Effects in reducing the mobility of oil-sand cores and increasing impact strength were confirmed by laboratory investigations using three types of impact and sag tests. (E18)

17-E. Plaster Molds Give Close Tolerances. Edwin Bremer. *Foundry,* v. 79, Jan. 1951, p. 76-79, 144.

Manufacture of small castings to extremely close tolerances by the plaster-molding process on a production basis requires careful control and coordination of all operations from making the pattern to final inspection of the finished product. A number of ingenious arrangements have been developed at Universal Castings Corp., Chicago, to perform certain operations automatically, and thus reduce the chance of error. (E16)

18-E. Conversion to Castings Results From Foundry Engineering. *Foundry,* v. 79, Jan. 1951, p. 80-81.

How conversion of a car-trailer attachment from a weldment to a casting assembly resulted in greater strength, lower weight and cost, and improved appearance. (E general, T7, CI)

19-E. Pipe Molding Methods. Pat Dwyer. *Foundry,* v. 79, Jan. 1951, p. 88-89, 220-223.

Recommended procedures for sand casting flanged cast-iron pipe. Sources of trouble. (E11, CI)

20-E. "White Coal" Pig Iron. E. K. Smith. *Foundry,* v. 79, Jan. 1951, p. 90-93, 216-218.

Tests to determine the properties of castings made with an imported pig iron produced by the charcoal-electric process. This iron contains considerable amounts of V and Ti but only small quantities of P and S. Photomicrographs of structures, and mechanical properties. (E10, Q general, M27, CI)

21-E. Effect of Oxygen Content on Iron Casting Properties. F. S. Kleeman. *Foundry,* v. 79, Jan. 1951, p. 100-103, 237-241.

Causes of excessive amounts of iron oxide in gray iron and malleable iron castings and their influence on microstructure and other properties. Deoxidation methods, with particular reference to SiC additions to the cupola. Micrographs and macrographs. 11 ref. (E10, E25, CI)

22-E. ABC of Foundry Practice. Carbon and Its Effect on Cast Iron. Donald J. Reese. **Methods of Gating Sand Molds.** Pat Dwyer. *Foundry,* v. 79, Jan. 1951, p. 121, 124, 126.

First of a series based on new edition of "Elementary Foundry Technology," by Lawrence A. Hartley, Penton Publishing Co., 1941. (To be continued.) (E25, E22, CI)

23-E. How to Use the Cupola. Bernard P. Mulcahy. *Foundry,* v. 79, Jan. 1951, p. 138, 141, 144.

First of a series discussing basic factors involved in operating the cupola. (E10, CI)

24-E. Midget Cupola Used in Research Work. *Foundry,* v. 79, Jan. 1951, p. 146.

Used by U. S. Graphite Co., a division of Wickes Corp., Saginaw, Mich. Dimensions include: shell, 7½ in. i.d.; lining, 4½ in. i.d.; total height, 30 in. (E10, CI)

25-E. New Sand Testing Method Used to Eliminate Casting Defects. W. H. Moore. *Foundry*, v. 79, Jan. 1951, p. 152, 154, 176, 178.

New patented method and equipment developed by Meehanite Metal Corp. Emphasis of control is placed on developing strength in the sand body to withstand rupturing forces rather than on reducing rupturing forces to the point where they do not exceed strength characteristics of the sand. Methods of achieving such strength. (E18)

26-E. Diameter of Pipes for Transmitting Blast From Blower to Cupola. Table of Air Pressure Through Pipes. Table of Air Velocity Through Pipes. *Foundry*, v. 79, Jan. 1951, p. 157-158.

Tabular and graphical presentations. (E10, CI)

27-E. Michigan Foundry Conference Studies Air Pollution Problems. Edwin Bremer. *Foundry*, v. 79, Jan. 1951, p. 160, 164-165.

Summarizes proceedings of conference at Michigan State College, East Lansing, Nov. 10-11, 1950. (E general, A7)

28-E. Methods of Producing Nodular Cast Iron. R. Collette and Albert De Sy. *Foundry Trade Journal*, v. 89, Dec. 14, 1950, p. 495-498.

Use of various elements. Photomicrographs show effects of Li, Ca, Sr, Ba, Na, B, and Te. Concludes that Mg is most satisfactory from economic and technological viewpoints. (E25, CI)

29-E. Fumes from Oil-Bonded Cores. *Foundry Trade Journal*, v. 89, Dec. 14, 1950, p. 499-500. (Condensed from "Technical Report on Practical Methods of Reducing the Amount of Fumes From Oil-Bonded Cores," H. M. Stationery Office, London.) (E21)

30-E. Experiences With Nodular Cast Iron. (In German.) *Neue Giesserei*, v. 37 (new ser., v. 3), Nov. 16, 1950, p. 520-522. (Translated and condensed from *Gjuteriet*, v. 40, 1950, p. 31-37.)

Results of experiments with Cu-Mg and Ni-Mg alloys as nodulizing agents. Photomicrographs illustrate structures obtained. (E25, CI)

31-E. Development of Casting Methods for Liquid-Cooled Cylinder Blocks of Aluminum Alloy "G": Al-Si-Mg. (In German.) Philipp Schneider and Wilhelm Petzka. *Neue Giesserei*, v. 37 (new ser., v. 3), Oct. 19, 1950, p. 461-466; Nov. 2, 1950, p. 488-491; Nov. 16, 1950, p. 515-520. (E general, Al)

32-E. On Metal Penetration in Casting. (In English.) Jiro Kashima. *Japan Science Review*, ser. 1, v. 1, Mar. 1949, p. 110-114.

Chemical and physical causes of penetration of metal into the structure of the molding sand. Relative merits of various binders and applicability to ferrous and nonferrous castings. (E18)

33-E. Study on Nodular-Graphite Cast Iron. II. The Graphite-Nodulizing Magnesium Alloys. Tatsuo Tanaka, Akira Muramatsu, and Takeshi Hayakawa. *Journal of Mechanical Laboratory*, v. 4, May 1950, p. 97-101.

Various compositions of nodulizing agents containing Mg were studied in order to determine which alloys would give the best recovery of Mg and the least reaction during addition. (E25, CI, Mg)

34-E. Study on Surface of Casting. IV. Roughness of Green Sand Mold, and Castings. (In Japanese.) Kazuo Katori, Tsuneyuki Okakura, and Kenji Hashimoto. *Journal of Mechanical Laboratory*, v. 4, May 1950, p. 126-136.

Experimental study of the effects of variations in molding sand, of facing material, and of binders, etc. (E18)

35-E. Malleable Cast Iron Treated With Magnesium. (In Japanese.) Hiromu Tanimura and Fumio Seki. *Journal of The Casting Institute of Japan*, v. 22, no. 8, 1950, p. 1-21.

Experiments on the Mg treatment for production of nodular cast iron. Data and photomicrographs. 12 ref. (E25, CI)

36-E. Gas Evolution From an Oil-Sand Core. (In Japanese.) Michio Ohno. *Journal of the Casting Institute of Japan*, v. 22, No. 8, 1950, p. 21-29.

Effects of various raw materials and different drying methods. 11 ref. (E18)

37-E. Stickiness of Sand to Patterns in Molding Operations. I. (In Japanese.) Shintaro Hayashi and Shuichi Sugihara. *Journal of the Casting Institute of Japan*, v. 22, no. 9, 1950, p. 4-7.

Results of various experiments conducted to prevent sand sticking to patterns during the molding operation. (E19)

38-E. Foundry Pours Burglar-Proof Doors. *Iron Age*, v. 167, Jan. 18, 1951, p. 68-69.

Procedures by which cast steel safe doors and frames are backed with copper and cast iron by pouring operations. (E23, CI, Cu)

39-E. Designing for Investment Casting. R. L. Wood and D. Von Ludwig. *Machine Design*, v. 23, Jan. 1951,

p. 154, 190, 192. (Condensed from "The Fields of Utility of Investment Castings".)

Recommendations. No diagrams. (E15, EG-a)

40-E. Magnesium Bomber Wheels Cast to Close Tolerances. *Steel,* v. 128, Jan. 22, 1951, p. 85.

Process at Wellman Bronze & Aluminum Co. (E11, Mg)

41-E. Tests on Air Preheating and Equilibria in a 900-Mm.-Diameter Cupola. (In Italian.) Pier Giovanni Maceraudi. *Metallurgia Italiana,* v. 42, Oct. 1950, p. 347-351.

See abstract under similar title from "Internation Gieterij Congres 1949—Amsterdam", (French version.); item 303-D, 1950. (E10, Fe)

42-E. Research on Some Factors Which Influence the High-Temperature Characteristics of Foundry Sands. (In Italian.) Mario Ongaro. *Metallurgia Italiana,* v. 42, Oct. 1950, p. 352-356.

Influence of various moisture and organic-binder contents. Influence of quartz powder, of iron oxide, and of grain size on cohesion at room temperature and on resistance to thermal shock. (E18)

43-E. Ladle Treatment of Cast Iron With Manganese-Containing Alloys. (In German.) Adalbert Wittmoser. *Neue Giesserei,* v. 37 (new ser., v. 3), Nov. 30, 1950, p. 533-540.

Selection of suitable alloying elements, proposed methods for computing effect of Mg treatment, and a method for calculating the amount of alloy to be added. 26 ref. (E25, Ci, Mg)

44-E. The Most Commonly Used Molding Machines. (In German.) W. Gesell. *Neue Giesserei,* v. 37 (new ser., v. 3), Nov. 30, 1950, p. 547-550.

Various types described and diagrammed. (E19)

45-E. Contribution to the Study of Preparation of Molding Sands. (In Czech.) Lev Petrzela. *Hutnické Listy,* v. 5, Sept. 1950, p. 353-359, Oct. 1950, p. 406-412.

Effects of various preparation and composition factors. Use of bentonites and their influence on aging of the sands. 35 ref. (E18)

46-E. Graphical Presentation of the Results of Tests on Molding Sand. (In Japanese.) Unokichi Ouchi and Yoshiyuki Nakazawa. *Journal of the Casting Institute of Japan,* v. 22, no. 4, 1950, p. 1-15.

Details of construction of a "grain-fineness" diagram said to be superior to other diagrams which have been used to show relationships between moisture, casting surface, permeability, and strength. (E18)

47-E. Use of Repetition Sand Casting. (In Japanese.) T. Usui. *Journal of the Casting Institute of Japan,* v. 22, no. 9, 1950, p. 1-3.

It is generally believed that mechanical castings should be done in green or dry-sand molds, while precision castings only need be done in baked molds. However, it is shown that use of the latter on Al castings is advantageous. Defective castings were reduced from 60 to 15%. (E19, Al)

48-E. Pouring Properties of Some Aluminum Alloys. (In Japanese.) S. Torii. *Journal of the Casting Institute of Japan,* v. 22, no. 10, 1950, p. 1-8.

Pouring temperature or degree of superheating. Proposes a correction for degree of superheating by adding half of the liquidus-solidus temperature difference to the degree of superheating. (E23, Al)

49-E. Research on Molding Sand Binders, III. (In Japanese.) Toshisada Makiguchi. *Journal of the Casting Institute of Japan,* v. 22, no. 10, 1950, p. 9-13.

5% by weight of various binders was added to the sand, and the test samples baked and tested. Results indicate two relationships between heating time and quantity of exfoliated sand grains. (E18)

50-E. (Book) **Grey Ironfounding.** 125 pages. 1950. Anglo-American Council on Productivity, 21 Tothill St., London S.W.1, England. 3s., 7d.

Report of the Productivity Team which visited the U. S. after first inspecting 29 jobbing foundries in Britain. The first part is divided in sections on productivity, problems facing the British industry, and findings and conclusions. The team then give their impressions of foundry buildings; management; the workers; working conditions; machinery, equipment, and power; patterns; metal melting and control; molding practice; coremaking practice and corebox equipment; molding and core sand; and accounting procedures. (E11, CI)

51-E. (Book) **Centrifugal Casting by the Cire Perdue Process.** C. Rosen. 204 pages. 1949. Bruce Publishing Co., Ltd., Bruce Grove, Watford, Hertfordshire, England.

Collates available information concerning the centrifugal adaptation of the lost-wax method of precision investment casting. The practical point of view on such topics as the production of a master pattern and mold, the casting, mounting and investing of wax patterns, vacuum treatment of investment, drying and preheating metal casting, and cleaning and finishing. (E14, E15)

52-E. Mold Materials Are Factors in Gray Iron Shrinkage. W. F. Bohm. *American Foundryman,* v. 19, Jan. 1951, p. 26-29.

It is commonly believed that the metal alone is responsible for defects in gray iron castings caused by shrinkage. However, recent investigations have proven that mold materials are also an important factor. Progress report on investigations conducted at Buick's gray iron foundry on the influence of mold material and the mold-wall movement concept. Effects of molding conditions, melting conditions, clay content, and sea-coal content. (E19, CI)

53-E. Ferrous Casting in Australia. *American Foundryman,* v. 19, Jan. 1951, p. 32-35. (Excerpts from paper by T. Watson, K. Spencer, A. T. Batty, and W. Dummett.)

Production figures; varieties of castings produced; sand practices; melting practices; metallurgical control; mechanization. (E general, CI)

54-E. Modern Foundry Methods: Plaster Molding for Precision Casting Put on Production Basis. J. J. McClain. *American Foundryman,* v. 19, Jan. 1951, p. 36-39.

Equipment and procedures of Fabricast Div., General Motors Corp. in production of the five precision Al-alloy castings for the converter end of the Buick automatic transmission. (E15, E16, Al)

55-E. Foundry Sand—Getting Down to Fundamentals. Clifford E. Wenninger. *American Foundryman,* v. 19, Jan. 1951, p. 45-48.

A number of ideas derived from work on sand-control fundamentals at University of Kentucky. (E18)

56-E. Basic Lined Cupola Permits Use of Lower Grade Scrap and Coke. Sam F. Carter. *American Foundryman,* v. 19, Jan. 1951, p. 50-51.

Results of four years work at American Cast Iron Pipe Co., Birmingham, Ala. The most promising application seems to be in the nodular-iron field. A second application is use of more high-sulfur scrap and lower-quality coke to make gray iron of normal or low sulfur content without need for ladle desulfurization. Third use is for reducing the phosphorus content directly by oxidation or indirectly by increasing the proportion of steel scrap. A fourth application is in duplex steelmaking. Data are tabulated and charted. (E10, D7, CI)

57-E. Pneumatic Deflashing Jig Speeds Core Flash Removal. John Starr. *Tool Engineer,* v. 26, Jan. 1951, p. 29.

(E24)

58-E. Moulding Technique. W. Pollock. *Foundry Trade Journal,* v. 89, Dec. 28, 1950, p. 551-557.

Methods for casting a large bulkhead door panel and frame, and a dome-shaped casting. (E19, CI)

59-E. Pressure-Cast Aluminium Matchplate Production. *Foundry Trade Journal,* v. 89, Dec. 28, 1950, p. 563-565.

Casting of aluminum under pressure in gypsum plaster molds. An abstract from the Grey Ironfounding Productivity Report and a commentary by B. S. N. Perry, who has had experience with the process in Britain and in America. A note is added on compositions of the plaster for making the mold. (E16, Al)

60-E. Practical Experiences in Producing Nodular Cast Iron. M. M. Hallett. *Foundry Trade Journal,* v. 90, Jan. 4, 1951, p. 3-9, disc., p. 9-12.

Work of a British firm on the Ce and Mg processes. (E25, CI)

61-E. Developments in the Parlanti Casting Process. *Machinery* (London), v. 78, Jan. 4, 1951, p. 3-8.

Since its introduction during the war, the patented casting process, employing anodized Al dies, developed by Conrad Parlanti Castings, Herne Bay, Kent, has made important progress; and, in addition to light alloys, iron and heat resisting steels have now been satisfactorily cast. As compared with gravity die castings made in the usual manner in cast iron or steel dies, those produced from Al dies are claimed to have an improved internal structure free from stress, localized chilling, and cavitation, with excellent surface finish and definition. (E13, T5, Al, CI, ST)

62-E. Foundry Technical Control; Correlation of Production Variants with Performance in Service. *Iron and Steel,* v. 23, Dec. 1950, p. 491-495.

Casting of ingot molds by Distington Engineering Co., Ltd., in England. (E general, T5, CI)

63-E. Composition and Properties of Sands. W. B. Parkes. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Dec. 1950, p. 575-593, disc., p. 594-596.

Emphasis on uses of sands and clays in foundry molds. 10 ref. (E18)

64-E. Core Bonding. R. G. Godding. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Dec. 1950, p. 597-617, disc., p. 618-625.

The base sand, organic binders, green binders, effect of clay on

molding properties, properties of baked cores, oil binders, and "extenders". (E21)

65-E. Sand Testing and Its Interpretation in the Foundry. W. B. Parkes. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Dec. 1950, p. 627-642, disc., p. 642-645.

Various methods with emphasis on those which have not been standardized in Britain. (E18)

66-E. High-Frequency Heating Units for Core Baking. R. G. Godding. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Dec. 1950, p. 647-654, disc., p. 654-657.

Experimental investigation of use of these units for baking cores containing different types of binders. (E21)

67-E. The Effect of Pitch and Coal Dust on the Properties of Sands. D. A. Taylor. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Dec. 1950, p. 659-672, disc., p. 672-676.

Effect of coal dust on the physical properties of sand and effect of pitch on the properties of molding sand were determined. Appendix by A. Mayer gives recommended procedure for determination of pitch in molding sand. (E18)

68-E. Natural and Synthetic Sands. W. B. Parkes. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Dec. 1950, p. 677-686, disc., p. 687-691.

Differences in properties of available raw materials; differences due to methods of production; selection of sand; and semi-synthetic sands. (E18)

69-E. Influence of Sand on the Formation of Scabs. D. A. Taylor. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Dec. 1950, p. 693-698, disc., p. 699-701.

Different iron casting defects known as "scabs"; possible causes and remedies. Results of an investigation made to determine the manner in which incidence of the defect is affected by the molding sand used. (E25, CI)

70-E. Remarks on Utilization of Induction Furnaces in Nonferrous Foundries. (In French.) Charles Lachaud. *Revue de Métallurgie*, v. 47, Nov. 1950, p. 817-824.

Observations on induction furnaces, especially as used for melting copper and light alloys. Data are limited to determination of consumption of electrical energy by different types of furnaces and its relation to quality of the product. (E10, Cu, Al)

71-E. Remarks on the Foundry Control of Lead-Bronze Bearings. (In German.) Albert Keil. *Zeitschrift für Metallkunde*, v. 41, Oct. 1950, p. 325-331.

Effects of various foundry conditions, especially of gas content of the melt, on quality. Includes graphed and tabulated data, micrographs, and X-ray pictures. 16 ref. (E25, Cu, EG-c)

72-E. Modernized Foundry Gains in Efficiency and Capacity. Carl G. Presser. *Foundry*, v. 79, Feb. 1951, p. 92-97, 236.

Modernized layout, equipment, and procedures of gray-iron foundry of National Supply Co.'s Engine Div., Springfield, Ohio. (E11, CI)

73-E. A Theoretical Basis for the Design of Gates. Morris J. Berger and Charles Locke. *Foundry*, v. 79, Feb. 1951, p. 112-117, 237-242.

How to predict qualitatively the behavior of liquid metal flowing from a manifold gating system of circular cross section. A design tool for use in conjunction with experience in gating practice. (E22)

74-E. Effect of Time and Temperature on Strength of Baked Cores. Charles E. Fausel. *Foundry*, v. 79, Feb. 1951, p. 118-119, 234-236.

Qualitative discussion of time and temperature effects; also of effects of different materials. (E21)

75-E. How to Cast a Heavy Table. Pat Dwyer. *Foundry*, v. 79, Feb. 1951, p. 120-121, 211-212.

Ramifications of the problem include type of mold, position in mold, number and size of gates and risers, probable shrinkage and contraction, tendency toward warpage, metal composition, temperature and velocity of metal entering the mold, furnace and ladle capacity. The tables were for hydraulic presses (7x10 ft. x 12 in. and 8x13 ft. x 15 in.), of solid cast iron. (E11, CI)

76-E. Foundry Practice for Nonferrous Casting Alloys. *Foundry*, v. 79, Feb. 1951, p. 143-144.

Melting practice and molding sands used. A data sheet. (E10, E18, EG-a)

77-E. Silicon and Its Effect on Cast Iron. Donald J. Reese. *Foundry*, v. 79, Feb. 1951, p. 182, 184.

Its function, foundry technique, effect on structure. (E25, CI)

78-E. Develops New Type Matchplate Frame. Franz Schumacher. *Foundry*, v. 79, Feb. 1951, p. 194, 196.

See abstract of "Insertion Process Cuts Cost of Matchplate Manu-

facture," *American Foundryman,* item 451-E, 1950. (E17)

79-E. How to Select Nonferrous Alloys for Investment Castings. Rawson L. Wood and Davidlee V. Ludwig. *Materials & Methods,* v. 33, Jan. 1951, p. 78-82.

Foundry characteristics and engineering properties. (E15, EG-a)

80-E. Procedures Used in Precision-Casting Foundry. William F. Davenport. *CADO Technical Data Digest,* v. 16, Feb. 1951, p. 19-23.

Discovery and application of a new precoating material, alumina-silica, which improves precision casting of alloys having a high Cr content. Techniques used in the process are believed superior to those generally used in this field. The work was conducted in a precision foundry at the Materials Laboratory, Air Materiel Command Headquarters. (E15)

81-E. Production of Porcelain Enameled Cast Iron Plumbing Fixtures. Walter Rudolph. *Finish,* v. 8, Feb. 1951, p. 19-21, 53.

A nontechnical description of all principal production operations. (E11, L27, T4, CI)

82-E. Evacuated Permanent Molds Used for Casting Aluminum Cylinders. C. F. Nagel, Jr., B. C. McFadden, and G. D. Welty. *Modern Metals,* v. 6, Jan. 1951, p. 26. (From "Fabrication of Aluminum in Germany", Office of Military Government for Germany.) (E12, Al)

83-E. Centrifugally Cast Hard Metal Alloys Bring Longer Life and Improved Design. Charles E. Rogers. *Western Metals,* v. 9, Jan. 1951, p. 22-23.

Process by which miscellaneous parts subject to extreme abrasion are cast by Stoody Co., Whittier, Calif. Base materials are either ferrous or nonferrous, largely cobalt. In both groups, the hard particles are complex carbides of Cr, W, etc. Experience has shown that best results are obtained when the castings are produced by a special centrifugal process which involves casting at very high speed with a rapid quench. Various applications. (E14, C-n, Fe, Co, SG-m)

84-E. Zirconite Sand in Foundry Practice. *Light Metals,* v. 14, Jan. 1951, p. 50-52.

Properties, and use for casting Al and Mg. It is used chiefly in making molds and cores or facings in which high casting temperatures prevail, other important uses being linings for induction melting furnaces, and seals for metal heat treatment furnaces. (E18, Al, Mg)

85-E. Cast Structures in Super-Pure and Commercially Pure Aluminium. V. Kondic and D. Shutt. *Journal of the Institute of Metals,* v. 78, Sept. 1950, p. 105-117.

Macrostructures of cast super-pure and commercially pure Al were correlated with: degree of superheating of the metal, rate of cooling, and turbulence in the metal during the filling of the mold. Foreign nuclei play the greatest part in refining the grain-size of the two grades of Al used; mechanical disturbance is not so effective; and increasing the rate of cooling is least effective. 14 ref. (E25, M28, Al)

86-E. The Influence of Alloy Constitution on the Mode of Solidification of Sand Castings. R. W. Ruddle and A. L. Mincher. *Journal of the Institute of Metals,* v. 78, Nov. 1950, p. 229-248.

An experimental study of the mechanism of solidification of castings in a number of nonferrous metals and alloys differing widely with respect to constitution, freezing temperature, freezing range, and thermal properties. Solidification of cylinder and slab castings of each material was investigated. Pure metals were Al, Cu, Mg, and Zn. The alloying elements included Sn and Si. (E25, N12, Al, Cu, Mg, Zn)

87-E. Basic Principles of Die Design. The Use of Loose Die Inserts. The Location of Inserts in Die Casting Dies. H. K. Barton and L. C. Barton. *Machinery* (London), v. 77, Dec. 28, 1950, p. 727-731; Jan. 25, 1951, p. 157-164. (E13)

88-E. Chilled-Roll Manufacture. K. H. Wright. *Foundry Trade Journal,* v. 90, Jan. 11, 1951, p. 33-40; Jan. 18, 1951, p. 61-67; disc., p. 67-68.

First part: history of rolls and requirements of the finished product. General characteristics, such as the formation of chill and its control, composition, and stability of structure. Various qualities of rolls, including alloy rolls, duplex-poured rolls, and the indefinite-chill type; typical compositions. Photomicrographs illustrate structures of different alloy compositions and treatments. Corresponding mechanical properties. Second part: foundry procedures, a modern pulverized-fuel, foundry furnace, and methods of testing and inspection. (E11, T5, CI)

89-E. The Nature of Molding Sand and Its Study by New Testing Methods. (In German.) W. Reitmeister. *Neue Giesserei,* v. 37 (new ser., v. 3), Dec. 28, 1950, p. 585-588.

Attempts to explain why certain sands with low clay content have

greater compressive strength than those of higher clay contents. (E18)

90-E. The Behavior of Hydrogen and Water Vapor in Bronze and Red-Brass Melts. (In German.) *Neue Giesserei,* v. 37 (new ser., v. 3), Dec. 28, 1950, p. 593-594. (From paper by P. O. Björkman, S. Brennert, A. Heutz, and A. Wallgram, *Gjuteriet,* v. 40, 1950, p. 61-67.)

Includes results of experiments made to determine effects of H_2, O_2, P, Zn, and Sn on water-vapor content of the melts, which is responsible for porosity. (E25, Cu)

91-E. Problems and Developments in the Malleable Iron Field. (In Swedish). Bertil Tyberg. *Gjuteriet,* v. 40, Nov. 1950, p. 181-188.

A brief survey of the malleablizing process. Methods of melting white iron used in Sweden and the U. S. Utilization of Te as a carbide stabilizer in heavy sections as well as B additions to counteract the bad effects of Cr, with reference to the author's experiments. Different methods employed to shorten the malleablizing cycle or otherwise to make the process more economical. (E10, J23, CI)

92-E. On Metal Penetration in Casting. (In English.) Jiro Kasima. *Reports of the Casting Research Laboratory,* Jan. 1950, p. 7-12.

Various physical and chemical causes and effects of various factors. (E23)

93-E. Evolving Gases on Solidification of Molten Cast Iron. Part I. On Electric Cast Iron. (In English.) Minao Nakano. *Reports of the Casting Research Laboratory,* Jan. 1950, p. 13-16.

Gases evolved were collected and analyzed. Qualitative relationships were found between composition of the evolved gas and chemical composition and fluidity of the cast iron and percentage of waste products in the foundry. (E25, CI)

94-E. Effect of Blast Volume in Cupola Melting. (In English.) Nobutaro Kayama. *Reports of the Casting Research Laboratory,* Jan. 1950, p. 17-19.

Results of investigation. (E10, CI)

95-E. On the Flow-Dynamics of Molten Metals. Part 1. On the Discharge Coefficient of Mercury Through the Small Circular Orifices. (In English.) Kiyoshi Yokota. *Reports of the Casting Research Laboratory,* Jan. 1950, p. 20-25.

First of a series of reports of fundamental investigations made to improve the quality of castings and casting efficiency. (E23)

96-E. How to Use the Cupola. Part II. Bernard P. Mulcahy. *Foundry,* v. 79, Feb. 1951, p. 186, 188-189.

Importance of proper alignment. (To be continued.) (E10, CI)

97-E. Diecasting Machines Fed Automatically. Herbert Chase. *Iron Age,* v. 167, Feb. 15, 1951, p. 100-103.

How electromagnetic molten-metal pumps feed metal directly into diecasting machines, eliminating the hand ladling formerly used. Two pumps act as holding furnaces, receiving metal from one melting unit and insuring a uniform supply of molten metal at constant temperature to two cold-chamber machines. (E13)

98-E. Costs vs. Benefits of Oxygen-Enriched Cupola Melts. Fred Carl. *American Foundryman,* v. 19, Feb. 1951, p. 28-29.

Reviews and summarizes results reported in recent papers by W. C. Wick, E. S. Clark, and F. J. Webbere. (E10, CI)

99-E. What To Do About Air Pollution: Foundry Dust Control Problems. John M. Kane. **Air Pollution and Public Health.** Kenneth E. Robinson. **Air Pollution Legal Aspects.** Thaddeus Giszczak. *American Foundryman,* v. 19, Feb. 1951, p. 34-40.

(E general, A7)

100-E. Eliminate Second Inoculation in New Nodular Iron Process. Albert L. DeSy. *American Foundryman,* v. 19, Feb. 1951, p. 41-45.

Production of Mg-treated nodular iron involves a double treatment. An excess addition of Mg must be made in order to obtain a sufficient amount of residual Mg. Solidification of this iron results in a white or mottled structure. In order to obtain a gray nodular iron it is necessary to apply a second treatment, so-called secondary inoculation or graphitizing, consisting of addition of 0.3% or more of ferrosilicon or other silicon alloy. Results of first experiments show that combined Ca-Mg, Ca-Li, or Ca-Mg-Li treatments make it possible to omit the second step. (E25, CI)

101-E. Molding Unit for 50 Tons Daily Production of Finished Castings. *American Foundryman,* v. 19, Feb. 1951, p. 46-48.

Equipment of Chapman Valve Mfg. Co., Indian Orchard, Mass., which makes all types of iron, steel, and nonferrous valves and sluice gates. (E19)

102-E. Gray Iron Shrinkage Related to Molding Sand Conditions. Clyde A. Sanders and Charles C. Sigerfoos. *American Foundryman,* v. 19, Feb. 1951, p. 49-55.

Extensive experimental investigation at Michigan State College. 34 ref. (E25, E18, CI)

103-E. Norwegian Foundrymen Look at America's Ferrous Foundries. John L. Sissener. *American Foundryman,* v. 19, Feb. 1951, p. 56-58.

Impressions of 18-man Norwegian Foundry Productivity Team. (E general, CI)

104-E. Beryllium Copper Parts Designed for Investment Casting. John T. Richards. *Product Engineering,* v. 22, Feb. 1951, p. 114-117.

Investment-cast parts designed to take advantage of the unique properties of Be-Cu. Design limitations and advantages inherent in the casting method and physical and mechanical properties of the alloys. Finishing treatments. (E15, Q general, P general, Cu)

105-E. Operation of the Cupola. W. W. Levi. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 1-19.

Charging equipment, front-slagging cupolas, balanced-blast control, moisture-content control of blast, mechanical charging equipment, front-slagging cupolas, balanced-blast cupola, inoculants, carbon equivalent, and calculating carbon content of the iron. (E10, Fe)

106-E. Aluminum Alloy Castings; A Review of British Achievement. Frank Hudson. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 20-36; disc., p. 37.

Previously abstracted from preprint. See item 199-E, 1950. (E general, Al)

107-E. Nonferrous Investment Casting. Hiram Brown. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 38-51.

Previously abstracted from *Institute of British Foundrymen,* Paper No. 966. See item 343-E, 1950. (E15, Al, Cu)

108-E. Controlled Sand Produces Quality Castings. Bradley H. Booth. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 52-62.

Value of a standard control program for sand testing. Reviews the nature of sand, the reason for its use, and sand practice. Types of sand used at 11 representative midwestern foundries, and tests used for control. The better-known sand tests, and their practical value. (E18)

109-E. Ferrous Melting Furnaces in the United States and Canada. A. W. Gregg. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 63-68.

Progress in the industry, types of furnaces, etc. (E10, Fe)

110-E. A Study of the Principles of Gating. K. Grube and L. W. Eastwood. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 76-99; disc., p. 100-107.

Pouring methods, the design of pouring box, sprue, and horizontal runner and gate systems. Methods employed and results obtained from May 1, 1949 to June 11, 1950. (E22)

111-E. Melt Quality and Fracture Characteristics of 85-5-5-5 Red Brass. F. M. Baker, C. Upthegrove, and F. B. Rote. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 122-131; disc., p. 131-132.

Second progress report. Data obtained in the search for a more rapid method of accurately evaluating melt quality on the basis of fracture characteristics. (E25, Q26, Cu)

112-E. Tenth Annual Report on the Investigation of Steel Sands at Elevated Temperatures. R. G. Thorpe, Peter E. Kyle, and John P. Fraser. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 133-143; disc., p. 143.

Summarizes load-deformation testing and stress-strain characteristics of two synthetic-resin and sand mixtures. Preliminary test work on scab-forming tendencies. (E18)

113-E. Report on A.F.S. Steel Division Research Project. Clyde Wyman. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 144-146.

Fundamental study of the influence of mold and core sand properties on development of hot tears in steel castings. (E18, CI)

114-E. Influence of Dry Sand Conductivity on Rate of Freezing of Steel Slabs. V. Paschkis. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 147-151; disc., p. 151-152.

Previously abstracted from preprint. See item 179-E, 1950. (E18, CI)

115-E. The Contribution of Riser and Chill-Edge Effects to Soundness of Cast Steel Plates. H. F. Bishop and W. S. Pellini. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 185-196; disc., p. 196-197.

The size of cast steel plates which can be made radiographically sound without resource to padding or chills was determined for various riser and chill edge conditions. Temperature measurements were made in plate sections to relate casting soundness to thermal gradients. (E22, CI)

116-E. Technique of Producing Pressure Cast Aluminum Matchplates. Kurt A. Miericke. *Transactions of the*

American Foundrymen's Society, v. 58, 1950, p. 198-201.

Critical steps in the process. (E16, Al)

117-E. A Study of Factors Affecting Molding Sand Density, Shrinkage, Expansion and Workability. R. P. Schauss, R. F. Baley, and E. E. Woodliff. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 217-225; disc., p. 225-228.

Previously abstracted from preprint. See item 182-E, 1950. (E18)

118-E. Effect of Superheating and Casting Temperatures on Physical Properties and Solidification Characteristics of Tin Bronzes. Bernard N. Ames and Noah A. Kahn. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 229-258; disc., p. 258-260.

Previously abstracted from preprint. See item 198-E, 1950. (E25, Q23, Cu)

119-E. Influence of Temperature on Fluidity and Surface Appearance of Steel Castings. G. A. Lillieqvist. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 261-266; disc., p. 266-269.

Previously abstracted from preprint. See item 178-E, 1950. (E25, S16, CI)

120-E. Solidification of Ingots. B. H. Alexander. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 270-273; disc., p. 273-275.

Solidification curves for duralumin were obtained at various pouring temperatures for two different size molds. Effects of overheating upon the solidification curves and upon the length of the columnar crystallization zone. Significance of the dumping method. 15 ref. (E25, Al)

121-E. Some Effects of Deoxidizing Additions on Foundry Malleable Irons. R. W. Heine. *Transactions of the American Foundrymen's Society,* v. 58, 1950. p. 277-293; disc., p. 293-297.

Previously abstracted from preprint. See item 181-E, 1950. (E25, Q general. CI)

122-E. Basic-Lined Cupola for Iron Melting. Sam F. Carter. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 376-392; disc., p. 392.

Previously abstracted from preprint. See item 197-E, 1950. (E10, CI)

123-E. A Thermodynamic Study of Pinhole Formation in Steel Castings. Robert E. Savage and Howard F. Taylor. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 393-396; disc., p. 396-399.

Previously abstracted from preprint. See item 189-E, 1950. (E25, P12, CI)

124-E. Casting of Magnesium-Rare Earth-Zirconium Alloys in Sand Molds. K. E. Nelson and F. P. Strieter. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 400-407; disc., p. 407-410.

Previously abstracted from preprint. See item 194-E, 1950. (E11, Mg, EG-g)

125-E. A Study of the Effect of Various Binders and Additives on Hot Strength of Molding Sands. Robert E. Morey and Carl G. Ackerlind. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 411-421; disc., p. 421-422.

Simplified syntnetically bonded sand mixtures containing western bentonite as the primary binder were tested for hot compressive strength at temperatures of 200-2500° F. A reference sand mixture containing 2% western bentonite and 3% water was selected for comparison with mixtures containing other clays and to evaluate effects of secondary sand binders and other additions. Organic binders were studied both as single binders and as secondary binders in combination with western bentonite. Additives were also studied. 59 ref. (E18)

126-E. Optimum Aluminum Additions in Commercial Yellow Brass. R. A. Colton and R. H. Gilbert. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 423-427; disc., p. 427-428.

Previously abstracted from *American Foundryman.* See item 151-E, 1950. (E25, Q23, Cu)

127-E. Pattern Materials and Production in Precision Investment Casting. E. I. Valyi. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 429-438; disc., p. 438.

Previously abstracted from preprint. See item 193-E, 1950. (E15, E17)

128-E. Phenolic Resin Core Binders; Effect of Core Composition on Physical Properties of Cores. J. E. McMillan and J. A. Wickett. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 439-447; disc., p. 447-449.

Previously abstracted from preprint. See item 185-E, 1950. (E18)

129-E. Precision Casting Aluminum in Moist Investment Molds. H. Rosenthal and S. Lipson. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 460-464; disc., p. 464.

Previously abstracted from *American Foundryman.* See item 150-E, 1950. (E15, Al)

130-E. Metal Melting; Application of Thermodynamic Principles to Melting Nonferrous Metals. Robert I. Moore. *Transactions of the American*

Foundrymen's Society, v. 58, 1950, p. 465-469; disc., p. 469-470.

Previously abstracted from preprint. See item 187-E, 1950. (E10, EG-a)

131-E. Treatment of Bond Clays for Foundry Sand. A. E. Pavlish. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 492-501; disc., p. 501-502.

Previously abstracted from preprint. See item 186-E, 1950. (E18)

132-E. Standard Data for Bench Coremaking. H. R. Williams. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 503-509; disc., p. 509.

Previously abstracted from preprint. See item 184-E, 1950. (E21, CI)

133-E. Effect of Moisture on Core Sand Mixtures. O. Jay Myers. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 557-562; disc., p. 562-563.

Changes which occur in the physical properties of cores when the moisture content of the sand is varied. (E18)

134-E. Fayalite Reaction in Sand Molds Used for Making Steel Castings. Robert E. Savage and Howard F. Taylor. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 564-575; disc., p. 575-577.

Previously abstracted from preprint. See item 190-E, 1950. (E19, CI)

135-E. Nature of Mold Cavity Gases. Charles Locke and Richard L. Ashbrook. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 584-594; disc., p. 594.

Previously abstracted from preprint. See item 180-E, 1950. (E23, CI)

136-E. An Investigation of Metal Penetration in Steel Sand Cores. S. L. Gertsman and A. E. Murton. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 595-601; disc., p. 601-603.

Previously abstracted from preprint. See item 183-E, 1950. (E21, CI)

137-E. Reproducibility of Foundry Sand Tests. B. H. Booth, P. C. Rosenthal and H. W. Dietert. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 611-619; disc., p. 619-620.

Previously abstracted from preprint. See item 188-E, 1950. (E18)

138-E. Flowability of Molding Sands. William H. Moore. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 650-658; disc., p. 658-660.

Previously abstracted from preprint. See item 196-E, 1950. (E18)

139-E. Principles of Gating Design; Factors Influencing Molten Steel Flow From Finger Gating Systems. W. H Johnson, W. O. Baker, and W. S. Pellini. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 661-668.

Previously abstracted from *American Foundryman.* See item 148-E, 1950. (E22, CI)

140-E. Cold Formed Flexible "Precision" Patterns and Core Boxes. R. B. Wagner and J. E. Wiss. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 675-679.

Previously abstracted from preprint. See item 201-E, 1950. (E17, T5, Al)

141-E. Production Patterns and the Matchplate. Robert F. Dalton. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 699-704.

Advantages and disadvantages of various types of pattern equipment. Economics of use of matchplates and the use of formulated metal-casting plaster in the matchplate industry. Possibility of applying the principles of the Al matchplate industry to other nonferrous foundry problems. 18 ref. (E17, Al)

142-E. Problems in Producing Ductile Iron. Max Kuniansky. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 705-709; disc., p. 709.

Raw materials and techniques for the treatment of cupola-melted metal with Mg alloys. (E25, CI)

143-E. Equipment for Degassing Magnesium Alloy Melts. Alex J. Juroff. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 715-716; disc., p. 717.

Previously abstracted from *American Foundryman.* See item 122-E, 1950. (E25, Mg)

144-E. An Alloy Designed for Pattern Shops. S. Zuckor. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 718-719; disc., p. 719.

Previously abstracted from preprint. See item 192-E, 1950. (E10, E11, Q general, Cu)

145-E. An Investigation of Melting and Casting Procedures for High Purity Nickel. Douglas W. Grobecker. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 720-727; disc., p. 727-728.

Previously abstracted from preprint. See item 191-E, 1950. (E10, E11, Ni)

146-E. Magnesium Foundry Practice in Canada. M. W. Martinson and J. W. Meier. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 729-736; disc., p. 736-738.

Previously abstracted from preprint. See item 195-E, 1950. (E general, Mg)

147-E. Castings for Machine Tools. A. G. Thomson. *Foundry Trade Journal,* v. 90, Jan. 25, 1951, p. 101-104.

Ferrous and nonferrous foundry practice of British firm which specializes in production of machine tools. (E11, T5)

148-E. Low Frequency Melting of Aluminium Alloys; Birlec-Tama Furnaces at Rogerstone. *Metal Industry,* v. 78, Jan. 26, 1951, p. 63-64.

(E10, Al)

149-E. Flat Patterns Made From an Improved Plaster. (In French.) Pierre Nicolas and Jacques Happich. *Fonderie,* Nov. 1950, p. 2237-2244.

Use of magnesia cement for plaster patterns. Method of preparation; physical, chemical, and mechanical properties. Details of use in the foundry. (E16)

150-E. Investigation of Cracks in Light-Alloy Castings. (In French.) André Tatur. *Fonderie,* Nov. 1950, p. 2245-2246.

Methods used by other investigators are summarized in tabular form. A new design of a test casting for this purpose. Results for the alloys A-U4NT and A-U5GT. 16 ref. (E25, Al, Mg)

151-E. Cracking, Loss of Toughness, and Strength of Gray Iron Castings. (In Czech.) E. Jekerle. *Hutnické Listy,* v. 5, Nov. 1950, p. 441-443.

The development of cracks in castings occurring at certain times like an epidemic. Investigation led to the conclusion that castings tend to crack when produced from pig iron produced at too high rates in the blast furnace. (E25, D1, CI)

152-E. Check Your Design and Save Metal. *Die Castings,* v. 9, Feb. 1951, p. 20-22.

Die-casting design principles. (E13)

153-E. Drying of Foundry Moulds and Cores. G. T. Hampton and W. H. Taylor. *Engineering,* v. 171, Feb. 2, 1951, p. 125; Feb. 9, 1951, p. 174. (A condensation).

Various types of equipment, its fuel consumption, and operating characteristics. (E19, E21)

154-E. Colloidal Graphite Lubricates Diecasting Machines. W. E. Lang. *Iron Age,* v. 167, Feb. 22, 1951, p. 83-84.

Advantages over conventional lubricants, especially when casting Al or Zn. (E13, Al, Zn)

155-E. Better Magnesium Melting Method Cuts Die Casting Rejects to .5%. Gerald C. Robechaud. *Western Metals,* v. 9, Feb. 1951, p. 26-27.

Procedures and equipment of McCulloch Motors Corp., Los Angeles. (E13, Mg)

156-E. An Improved Casting Process with Resin-Sand Moulds. H. W. Perry. *Aircraft Engineering,* v. 22, Dec. 1950, p. 371, 374.

Details of a new method developed by Bakelite Corp. from the Johannes Croning system. (E18)

157-E. Big Magnesium Foundry: New Alloy Castings for Air Force Results in Major Expansion. F. L. Church. *Modern Metals,* v. 7, Feb. 1951, p. 31-34.

Facilities and problems of Howard Foundry Co., Chicago. (E general, Mg)

158-E. Induction Furnaces Cut Foundry Melting Costs. Vernon Swan. *Modern Metals,* v. 7, Feb. 1951, p. 38-40.

Analysis of one of the biggest permanent-mold foundries, National Pressure Cooker Co., Eau Claire, Wis. Case in favor of induction melting of Al alloys. (E10, E12, Al)

159-E. Foundry Innovations Produce Big Savings. A. S. Hall. *Iron Age,* v. 167, Mar. 1, 1951, p. 110-113.

Simple expedients which help reduce labor costs and waste at the Buick gray-iron foundry. Novelties in cleaning practice cut time besides making castings better adapted to machining and service requirements. Manual handling is kept at a minimum. (E general, L12, CI)

160-E. The Fields of Utility of Investment Castings. R. L. Wood and D. von Ludwig. *Industrial Gas,* v. 29, Feb. 1951, p. 10-13, 20-25.

The many types of problems which are being handled by the investment process. Separated into four groups, they afford a logical way to consider the broad aspects of investment casting application. (E15)

161-E. The Fields of Utility of Investment Castings. R. L. Wood and D. Von Ludwig. *Mechanical Engineering,* v. 73, Mar. 1951, p. 191-197.

See item 160-E above. (E15)

162-E. Silicones Can Mean More Production, Less Maintenance. *Steel,* v. 128, Mar. 5, 1951, p. 87-90.

Properties and miscellaneous applications of silicones as lubricants, mold-release agents in die casting, insulating resins, and high-temperature-coating ingredients. 11 ref. (E13, Q9, L26)

163-E. Casting Steel Crankshafts. Edwin Bremer. *Foundry,* v. 79, Mar. 1951, p. 84-87, 245.

Equipment and procedures of Auto Specialties Mfg. Co., Benton Harbor, Mich. (E11, CI)

164-E. Efficient Operation Doubles Foundry Production. Robert H. Herrmann. *Foundry,* v. 79, Mar. 1951, p. 90-95, 240-242.

Equipment and procedures of Massey-Harris Co., Ltd., Brantford,

Ont. Gray-iron farm-implement castings are made. (E11, T3, CI)

165-E. Selection and Use of Anthracite for Cupola Fuel. C. C. Wright. *Foundry,* v. 79, Mar. 1951, p. 96-97, 210-211.

Recommendations to foundries contemplating the substitution of anthracite for varying quantities of their usual cupola fuel. (E10, B18)

166-E. Instruments Keep Accurate Records. Maurice F. Degley. *Foundry,* v. 79, Mar. 1951, p. 108-111.

Use of recording instruments in the foundry. (E general, S16, S18)

167-E. Spanish Foundries. F. R. Morral. *Foundry,* v. 79, Mar. 1951, p. 138, 141.

(E general)

168-E. Electronic Core Baking. Boyd Hopkins. *Foundry,* v. 79, Mar. 1951, p. 154, 212.

Equipment and procedures at United Foundries Co., Wyoming, Pa. Several advantages. (E21)

169-E. Feeders for Castings; Foundry Sands—Composition, Particle Size. Pat Dwyer. *Foundry,* v. 79, Mar. 1951, p. 157, 160.

Practical recommendations. (E18)

170-E. Casting Tools for Molding Nonmetallic Materials. Thomas A. Dickinson. *Foundry,* v. 79, Mar. 1951, p. 190-192.

Fabrication procedures for cast-metal molds for nonmetallics. Although cast alloys lack some of the desirable characteristics of wrought products, the low cost of cast-metal tooling is an important factor. Patterns, molding methods, and alloys for different purposes. (E11, T6)

171-E. How to Use the Cupola. Bernard P. Mulcahy. *Foundry,* v. 79, Mar. 1951, p. 202, 204.

Concludes discussion of tap hole and cupola bottom. Types of charging equipment and metal handling. (To be continued.) (E10)

172-E. Induction Type Aluminum Melting Furnace. Manuel Tama. *Steel Equipment & Maintenance News,* v. 4, Feb. 1951, p. 6-7.

1000-kw. unit developed by Ajax Engineering Corp. (E10, Al)

173-E. The Croning Process for Moulds and Cores. H. N. Acker. *Canadian Metals,* v. 14, Feb. 1951, p. 30-31, 46.

New mold-making method which uses a thermosetting resin-sand mixture for low-cost, dust-free production. (E18)

174-E. Experimental Work on Oil-Sand Practice. D. T. Kershaw. *Foundry Trade Journal,* v. 90, Feb. 1, 1951, p. 115-122.

Tests made to determine the basic properties of core binders used in the foundry, and to help in the production of castings free from the type of defect usually associated with faulty oil sand. Work was done in a gray-iron foundry, but the results are applicable also to nonferrous materials. (E18)

175-E. Producing Ductile Cast Iron; Some Foundry Experiences. N. Croft. *Iron and Steel,* v. 24, Feb. 1951, p. 45-50.

Some of the ductile cast iron products currently being made. Development work and some of the problems encountered. Structure control and mechanical-test behavior. (E25, CI)

176-E. Foundry Melting Furnaces; Factors Governing Their Choice and Layout. F. C. Evans. *Metal Industry,* v. 78, Feb. 9, 1951, p. 103-105; Feb. 16, 1951, p. 123-125.

(E10)

177-E. Permeability of Sands. (In French.) Jacques Happich. *Fonderie,* Dec. 1950, p. 2302-2303.

The main factors influencing permeability, in particular grain size of the sand and moisture content. Data indicating relationship of these factors. (E18)

178-E. Some Effects of Melting Conditions on Defects of Cast Iron. I. (In Japanese.) Nobutaro Kayama. *Journal of the Casting Institute of Japan,* v. 22, No. 11, 1950, p. 1-7.

Effects of blast volume and melting temperature on shrinkage cavities in cupola melting. English abstract summarizes results. (E25, CI)

179-E. Study of the Surface of Castings. VII. (In Japanese.) Kazuo Katori. *Journal of the Casting Institute of Japan,* v. 22, No. 11, 1950, p. 7-13.

The relationship between mold surface, casting surface, and voids due to sand particles. The relationship between moldability, mold surface, and casting surface. Results are summarized in the English abstract. (E25)

180-E. Methods of Gating Sand Molds. Pat Dwyer. *Foundry,* v. 79, Feb. 1951, p. 180, 182.

Second of 3 articles. (To be concluded.) (E22)

181-E. Metal Penetration Test. S. L. Gertsman and A. E. Murton. *American Foundryman,* v. 19, Mar. 1951, p. 32-33.

Procedure for metal penetration in sand cores. (E25)

182-E. Manufacture of Bronze Boiler Drop Plugs. B. F. Kline and J. R. Davidson. *American Foundryman,* v. 19, Mar. 1951, p. 34-37.

Design and manufacture of plugs for steam-locomotive boilers by

Southern Pacific Railroad Co. Composition is 86-88% Cu, 6-7% Sn, 1-2% Pb, 3-4% Zn, 1.0% max. Ni, 0.25% max. Fe, and 0.05% max. P. Tests on various other compositions are outlined. (E11, Cu)

183-E. Mechanizing the Smaller Foundry. *American Foundryman,* v. 19, Mar. 1951, p. 40-43.
(E general)

184-E. Core Practice as Related to Malleable Foundry Losses. E. J. Jory. *American Foundryman,* v. 19, Mar. 1951, p. 44-47.
Ways in which losses may be reduced by changes in core practice, giving practical recommendations. (E21, CI)

185-E. Frozen Mercury Patterns Add Flexibility to Precision Casting. A. H. Allen. *Steel,* v. 128, Mar. 19, 1951, p. 66-69.
How intricate shapes are cast to close tolerances in wide variety of metals and alloys. Weights range up to 90 lb. (E15)

186-E. Bibliography of the Die Casting Process. Part I. Harold Bourassa. *Light Metal Age,* v. 9, Feb. 1951, p. 27-28.
Die casting of Al alloys. 142 ref. (To be continued.) (E13, Al)

187-E. Die Casting Die Design. Part IV. (Continued). H. K. Barton and James L. Erickson. *Tool & Die Journal,* v. 16, Mar. 1951, p. 72, 76, 84, 110.
Runner design, additional functions of the runner, and sprue-to-runner design for the horizontal cold-chamber machine. (To be continued.) (E13)

188-E. Die Castings Can Be Detailed for Easier Finishing. Hiram K. Barton. *Die Castings,* v. 9, Mar. 1951, p. 23-25, 64-67.
Design recommendations.
(E13, L general)

189-E. The Aluminium Casting Alloy D.T.D. 424 (Now Known as LM-4). D. C. G. Lees and W. H. Glaisher. *Metallurgia,* v. 43, Feb. 1951, p. 73-80.
This alloy was used extensively during the war as a substitute for alloys made from virgin materials. It has proved to be an excellent one for general castings. Influence of melting procedure and additions on the properties of materials made from swarf, skimmings, and virgin metals, also effects of grain size, gas content, and heat treatment.
(E25, Al)

190-E. Drying of Foundry Moulds and Cores. G. T. Hampton and W. H. Taylor. *Foundry Trade Journal,* v. 90, Feb. 15, 1951, p. 169-175.
Previously abstracted from condensed version in *Engineering.* See item 153-E, 1951. (E19, E21)

191-E. Modern Melting Practices. *Foundry Trade Journal,* v. 90, Feb. 15, 1951, p. 177-179.
Discussion of paper by F. C. Evans (Jan. 19, 1950 issue; item 63-E, 1950). (E10, Cu, Ni)

192-E. Pianoforte Frame Castings. *Foundry Trade Journal,* v. 90, Feb. 22, 1951, p. 199-204.
Production from gray iron by a British firm. (E11, CI)

193-E. Core-Blower Application and Operation. G. W. Fearfield. *Foundry Trade Journal,* v. 90, Feb. 22, 1951, p. 207-210; Mar. 1, 1951, p. 229-232; disc., p. 232-233.
A comprehensive treatise. (E21)

194-E. The Adherence of Sand on Steel Castings. P. R. Beeley and H. T. Protheroe. *Journal of the Iron and Steel Institute,* v. 167, Feb. 1951, p. 141-157.
Methods used for visual comparison of degree of roughness of steel castings, and for a numerical assessment of penetration. A relationship between metal penetration and sand adherence was established. The temperature limit at which adherence occurs, in the case of the standard casting adopted, was determined for casting temperature, metal composition, and sand conditions. Conditions at the sand-metal interface and an explanation of mechanism of adherence. Effect of varying the bonding agent. Relative merits of various mold coatings. (E11, CI)

195-E. A Large Aluminium Alloy Casting. *Engineer,* v. 191, Mar. 2, 1951, p. 284-285.
Casting has an o.d. of 7 ft., 9 in., a height of 7 ft., and weight of 7000 lb. It was made for use in a rotary vacuum filter. The pattern and molding methods. (E11, Al)

196-E. Investment Castings—Their Design and Limitations. D. F. B. Tedds. *Engineers,* v. 191, Mar. 2, 1951, p. 292-294.
Design factors, design considerations, process limitations, and costs. (E15)

197-E. (Book) **Die Casting.** H. H. Doehler. 502 pages. McGraw Hill Book Co., Inc., 330 W. 42nd St., New York 18. $8.00.
Covers the field from the history of die casting to present-day die-casting practices. Early and modern die-casting machines; selection and handling of die steels, and shop practice in construction of dies. Die-casting design, cost estimation, and comparative cost as compared to other mass-production methods. The various die-casting alloys, and advantages and disadvantages of each. Machining, finishing, and inspection

of die castings; organic, elctroplated and mechanical finishes. Safety precautions. (E13)

198-E. A New Type of Cupola. Tom Bishop. *Metal Progress,* v. 59, Mar. 1951, p. 376.

"Metallurgical blast cupola", which has been operating for over a year in Liege, Belgium, producing an average of 1200 metric tons of iron per month. Tests indicate that the iron produced is in certain respect superior to that made in the conventional cupola. Advantages and disadvantages. (E10, CI)

199-E. North British Steel Foundry, Bathgate. *Foundry Trade Journal,* v. 90, Mar. 8, 1951, p. 249-256.

Scottish jobbing steel foundry which produces straight-carbon and low-alloy steel castings from a few pounds up to about 5 tons in weight. (E11, CI)

200-E. Centrifugal Steel Castings for Gas Turbines. J. Taylor and D. H. Armitage. *Foundry Trade Journal,* v. 90, Mar. 8, 1951, p. 259-260, 265. (A condensation).

Evolution of the production of centrifugal castings, and fields of application of the horizontal and vertical-axis methods. Method of manufacture and the inspection procedure applied in order to attain the high standards essential for production of gas-turbine components. (E14, S13, CI)

201-E. Straight Cast-Iron Pipes. J. L. Handley. *Foundry Trade Journal,* v. 90, Mar. 15, 1951, p. 275-280.

Methods used in making of straight cast-iron pipes from the smaller sizes used for soil and vent pipes to the larger sizes of pressure pipes. Numerous diagrams. (E11, CI)

202-E. The "C" Process. *Foundry Trade Journal,* v. 90, Mar. 15, 1951, p. 281-284.

Production of castings from shell molds comprised of a thermosetting mixture of sand and synthetic resin. The mold shells are formed by contact between the mixture and heated pattern. (E18, E19)

203-E. Selecting Components for Die-Castings. W. M. Halliday. *Foundry Trade Journal,* v. 90, Mar. 15, 1951, p. 287-290.

Gravity vs. pressure casting of components, choice of alloy, size of component, physical limitations, quantities required, initial die costs, and die life and maintenance costs. (E13)

204-E. Mercury Patterns for Precision Casting. *Machinery* (London), v. 78, Mar. 8, 1951, p. 396-397.

Picture story of process developed by American Mercast Corp. The metals so far cast have included Al and stainless steel. (E15, Al, SS)

205-E. Repetition Castings. *Iron and Steel,* v. 24, Mar. 1951, p. 75-82.

Successful mechanization at a gray-iron foundry in Britain which specializes in heating and cooking stoves. Details of specific items. (E11, CI)

206-E. Core Supports. *Iron and Steel,* v. 24, Mar. 1951, p. 86.

Importance of correct choice of reinforcement for sand cores. (E21)

207-E. Sand Practice. W. B. Parkes. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Feb. 1951, p. 705-707; disc. p. 707-717.

Compares British and American practice. (E18)

208-E. General Metallurgical Aspects. H. T. Angus. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Feb. 1951, p. 719-721; disc. p. 725-736.

Compares metallurgical aspects of British and American foundry practice. (E25)

209-E. Melting Practice and Metal Handling. N. Charlton. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Feb. 1951, p. 723-725; disc. p. 725-736.

Compares British and American melting practices. (E10)

210-E. Foundry Operations and Equipment. 1. A. Kirkham. 2. G. W. Nicholls. 3. W. R. Marsland. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Feb. 1951, p. 763; 767-770; 773; disc. p. 764-766; 770-772; 773-774.

Compares various phases of British and American foundry practice. (E general)

211-E. Patterns. I. Small Patterns. W. R. Marsland. **2. Large Patterns.** E. J. Ross. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Feb. 1951, p. 775, 777; disc. p. 778-780.

Compares British and U. S. pattern-making practices. (E17)

212-E. Coremaking. M. Martin. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Feb. 1951, p. 781-782; disc. p. 783-786.

Compares British and U. S. coremaking practice. (E21)

213-E. Intensification of the Smelting Process in the Cupola. (In Russian.) B. G. Grinberg. *Torfyanaya Promyshlennost* (Peat Industry), v. 27, Dec. 1950, p. 18-20.

Methods designed to increase productivity of the cupola, decrease

fuel consumption, increase temperature of metal, and improve the quality of the product. Methods investigated include use of three rows of tuyeres, preheating of the cupola blast, and oxygen enrichment of the blast. Advantages of each are discussed. (E10, CI)

214-E. Study on Zinc Alloys for Casting. IV. Fluidity of Zamak Alloys. (In Japanese.) Kazuo Katori, Mikio Suzuki, and Kingo Naoki. *Journal of Mechanical Laboratory,* v. 4, no. 7, Oct. 1950, p. 268-273.

Effects of variations in composition, including Mg additions. Results are summarized in English. (E25, Zn)

215-E. Study on the Surface of Castings. VI. Screen-Test Method for Molding Sand. (In Japanese.) Kazuo Katori, Tsuneyuki Okakura, and Kenji Hashimoto. *Journal of Mechanical Laboratory,* v. 4, no. 7, Oct. 1950, p. 274-278.

Results of investigation are tabulated, charted, and summarized in English. (E18)

216-E. Choke Control in Finger Gating. W. H. Johnson, H. F. Bishop, and W. S. Pellini. *Foundry,* v. 79, Apr. 1951, p. 116-121, 275-278.

Various designs of finger-gating systems were studied to evolve general principles of choke control for multiple-finger gating systems. If a choke condition is developed at the finger inlets, the gating system becomes pressurized and forced, and uniform flow occurs from all fingers regardless of position. Geometric shape of the fingers was shown to be of secondary importance to choke control. The relationships between geometric and hydraulic choked conditions. (E22)

217-E. Deoxidation in Production of Nodular Cast Iron. Gerhard Derge. *Foundry,* v. 79, Apr. 1951, p. 122-123.

Experiments show that Mg treatment which results in nodule formation is also accompanied by deoxidation. The melting stock was prepared by saturating Armco ingot iron with carbon. Melting was done in a 15-lb. induction furnace, and 50% ferrosilicon was added to give an estimated 3% Si in the final product. The metal was poured at 1370° C. into a preheated transfer pot containing the Mg alloy and cast at once into dry sand molds. Samples were sucked into a chill mold by the modified wedge method just before pouring and after the Mg treatment. They were analyzed for O_2 by vacuum fusion and for residual Mg spectroscopically. Residual Al was also determined. (E25, CI)

218-E. Refrigeration Controls Blast Moisture. William K. Mitchell. *Foundry,* v. 79, Apr. 1951, p. 134-137.

A study of scrap loss in the gray-iron foundry of Delco-Remy Div., General Motors Corp., Anderson, Ind., showed that the scrap loss closely followed the humidity of the atmosphere. To combat this problem, equipment for dehumidifying the air being fed into the cupola was installed. (E10)

219-E. Principles of Risering. Charles F. Walton. *Foundry,* v. 79, Apr. 1951, p. 154, 156.

One of series on "ABC's of Foundry Practice." (E22)

220-E. New Cupola Design Has Many Features. *Foundry,* v. 79, Apr. 1951, p. 192.

New features in cupola construction designed by F. J. Zippler, Pittsburgh, said to save 25% fuel, increase melting capacity 25%, deliver real hot iron, and drop clean at the end of the heat. (E10, CI)

221-E. Report on Ultrasonics. Thomas A. Dickinson. *Foundry,* v. 79, Apr. 1951, p. 224, 226, 228, 230.

Use in the foundry for ultrasonic sirens to agglomerate smoke particles, for reflectoscopes to indicate defects, for magnetostriction generators for degreasing.
(E general, S general)

222-E. Mechanized Aids in the Foundry. A. S. Beech. *Engineering,* v. 171, Mar. 16, 1951, p. 324-326; Mar. 23, 1951, p. 355-358. **Further Mechanical Aids for the Foundry.** *Engineer,* v. 191, Mar. 16, 1951, p. 360-363. (A condensation.)

Some developments of the past decade. (E general)

223-E. The Production of Aluminium Alloy Pistons. *Machinery* (London), v. 78, Mar. 22, 1951, p. 463-471.

Procedures and equipment of British firm, with emphasis on gravity die casting, sand casting, several machining operations, and heat treatment.
(E11, E13, G17, J general, Al)

224-E. Selection of Al Casting Alloys on the Basis of Their Castability in Sand and Chill Molds (In French and German.) R. Irmann. *Aluminium Suisse,* Jan. 1951, p. 26-31.

Casting properties of the eight most important Al alloys. A table shows qualitatively comparative mechanical and chemical properties. (E11, E12, Al)

225-E. Advances in Foundry Practice During the First Half of 1950. (In German.) Paul A. Heller. *Stahl und Eisen,* v. 71, Jan. 4, 1951, p. 35-41; Jan. 18, 1951, p. 84-89.

Descriptive, correlated review of the literature. 100 ref. (E general)

226-E. Contribution to Knowledge Concerning "Temper Ore". (In German.) F. Roll. *Giesserei,* v. 38, (new ser. v. 4), Jan. 11, 1951, p. 4-8.

The composition of red hematite used for the production of malleable cast iron, also reactions occurring during the malleablizing process. "Temper ore" refers to a special type of ore most suitable for this process. 10 ref. (E11, J23, CI)

227-E. Rejects in the Gray-Iron Foundry With Special Emphasis on the Pig-Iron Problem. (In German.) E. Feil. *Giesserei,* v. 38 (new ser., v. 4), Jan. 25, 1951, p. 29-33.

Practical measures for reducing the amount of rejects and improving the quality of castings by addition of steel scrap to the charge; selection of proper molding sands; and maintenance of proper casting conditions. (E11, CI)

228-E. The Cement-Sand Mold and Core Process. (In German.) M. Beilhack. *Giesserei,* v. 38 (new ser., v. 4), Jan. 25, 1951, p. 37-39.

The mold is made of cement (of different kinds) and dustless sand. A graph shows the effect of water content on gas permeability. (E18)

229-E. Gate Design and Its Importance to Success in Casting (In German.) H. U. Doliwa. *Giesserei,* v. 38 (new ser., v. 4), Feb. 8, 1951, p. 49-51.

Application of fundamental physical principles to gating-system design. (E22)

230-E. The Significance of Reduced-Density Curves of Compacted Sands in Molding-Sand Testing. (In German.) W. Reitmeister. *Giesserei,* v. 38 (new ser., v. 4), Feb. 8, 1951, p. 54-57.

Swelling or "compactibility" curves of a sand often indicate properties of the sand (such as gas permeability and strength) which are difficult or impossible to determine by other testing methods. Specific sands and their respective test data. (E18)

231-E. Pressure Casting Process for Light Metals (In German.) R. Butz. *Giesserei,* v. 38 (new ser., v. 4), Feb. 8, 1951, p. 61.

Equipment and formulas for computing the applied pressures. (E13, Al, Mg)

232-E. Welding Gray Iron. (In German.) C. Stieler. *Giesserei,* v. 38 (new ser., v. 4), Feb. 8, 1951, p. 62-64.

Each of the various methods of welding; namely, thermite welding, gas welding, and cold and hot electric welding. (E general, CI)

233-E. Production of Nonshrinking Cores. (In German.) F. Roll. *Giesserei,* v. 38 (new ser., v. 4), Feb. 22, 1951, p. 76-79.

The compressibility of different core sands was determined at and above 20° C. The importance of sand compressibility in production of complex castings is demonstrated. (E18)

234-E. Reinforced Cast Iron. (In German.) K. Wittmoser. *Giesserei,* v. 38 (new ser., v. 4), Mar. 8, 1951, p. 110.

Gray iron with cast-in steel bars, the effect being similar to that of reinforcing bars in concrete—a considerable increase in strength. Includes photomicrographs. (E11, CI)

235-E. Removing Nonmetallic Inclusions in the Production of Babbitt Bearings, Especially Lead-Bronze Bearings. (In German.) A. Röhenbeck. *Metall,* v. 5, Feb. 1951, p. 57-58.

A series of U. S., British, and German patents dealing with this problem. (E25, Cu, SG-c)

236-E. Induction Heating in the Processing of Nonferrous Metals. (In German.) K. Kegel. *Metall,* v. 5, Mar. 1951, p. 103-106.

Use in the melting and soldering of nonferrous metals as well as in the production of tin-plate. 14 ref. (E10, K7, L16, EG-a)

237-E. General Observation on Light-Metal Melting. (In German.) W. Geuthner. *Metall,* v. 5, Mar. 1951, p. 107-110.

Factors to be considered in selecting the proper melting furnace. (E10, Al, Mg)

238-E. Chilled-Mold Casting of Brass. (In Dutch.) T. van der Klis. *Metalen,* v. 6, Feb. 15, 1951, p. 35-40; Feb. 28, 1951, p. 53-57.

Gravity die-casting of brass. The castings are between 50 and 1000 g. in weight. Special attention to practical aspects of the procedure. (E13, Cu)

239-E. Pouring Time in Relation to the Design of Gating Systems. (In Czech.) Jan Kieswetter. *Hutnické Listy,* v. 6, Jan. 1951, p. 14-22.

Theoretical development of formulas for determination of pouring time and dimensions of gating systems for gray-iron castings. Includes table for castings weighing 10 kg. to 40 tons and for wall thicknesses of 3-55 mm. Formulas are applied to several numerical examples. (E22, E23, CI)

240-E. Establishing Tolerances for Die Castings. H. K. Barton. *Product Engineering,* v. 22, Apr. 1951, p. 118-123.

Four conditions which affect dimensional accuracy of die castings:

differential thermal expansion, lateral misalignment, wear of register pins, and distortion on cooling. (E13)

241-E. Commercial Tolerances for Die Castings. H. K. Barton. *Product Engineering,* v. 22, Apr. 1951, p. 169, 171.

Tabulation for Sn, Pb, Zn, Al, Mg, and Cu. (E13, S22, Cu, Sn, Pb, Zn, Al, Mg)

242-E. Glass Solves Delicate Coring Problems. D. D. Malcomb. *Iron Age,* v. 167, Apr. 12, 1951, p. 107-109.

Thin, fragile Al cores necessary for the production of radar tube-feed antenna units by investment casting are reinforced with Pyrex glass tubes. By this means, the cores are able to withstand turbulence and shock of the metal entering the cavity. (E15, T1, Al)

243-E. Aluminum Alloy Die Castings. Floyd A. Lewis. *Foundry,* v. 79, Apr. 1951, p. 124-127, 271-274.

The basic principles involved in Al die casting and the types of alloys used. (To be continued.) (E13, Al)

244-E. Die Casting Die Design. Part IV. (Continued.) H. K. Barton and James L. Erickson. *Magazine of Tooling and Production,* v. 17, Apr. 1951, p. 79-80, 148, 150, 152-153.

Various aspects of runner design. (To be continued.) (E13)

245-E. Heat Extraction at Corners and Curved Surfaces in Sand Moulds. R. W. Ruddle and R. A. Skinner. *Journal of the Institute of Metals,* v. 79, Mar. 1951, p. 35-56.

The rate at which a sand mold removes heat from corners (both external and re-entrant) and curved surfaces of castings was determined by means of temperature measurements made in the mold. The solidification times of castings can be roughly calculated by mathematical analysis of heat flow through a plane surface, and more accurate estimates are possible by using the correction factors given for corner and curvature effects. (E25)

246-E. Segregation of Iron and Manganese in Some Aluminium Casting Alloys. W. H. Glaisher. *Metallurgia,* v. 43, Mar. 1951, p. 127-131.

Results of investigations of gravity segregation which may occur in alloys within or close to the specifications D.T.D. 424 and L.A.C. 112, due to the presence of undue amounts of Fe and Mn. Recommendations on composition limits and procedure to minimize this effect in the production of castings. (E25, Al)

247-E. (Pamphlet) **Fundamentals of Steel Castings Design.** Charles W. Briggs. 32 pages, 1951. Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15. $0.20.

Fluidity, shrinkage, strength, stresses, hot tears, and thickness as they are related to design. Designing of various joining sections, tolerances, redesigning of forgings and weldments, etc. (E25, CI)

248-E. Machines Make Shell Molds Automatically. William Czygan. *Iron Age,* v. 167, Apr. 19, 1951, p. 81-85.

Method and advantage of the process. Machine will take patterns up to 3000 lb., 3 in. thick, area 26 x 41 in.; and completes the molding cycle in 50-70 sec. (E19)

249-E. How to Set Up a Precision Casting Foundry. W. F. Davenport and Adolph Strott. *Iron Age,* v. 167, Apr. 19, 1951, p. 90-94.

See abstract of "Procedures Used in Precision Casting Foundry", *CADO Technical Data Digest,* item 80-E, 1951. (E15)

250-E. How to Handle Magnesium-Zirconium Casting Alloys. L. J. G. van Ewyk. *Modern Metals,* v. 7, Apr. 1951, p. 48-49.

How a Dutch company casts new alloys based on Mg. (E general, Mg)

251-E. Foundry Modernization Expands Gray Iron Casting Capacity. *Steel,* v. 128, Apr. 30, 1951, p. 60-62.

National Supply Co.'s Engine Div. plant, Springfield, Ohio. (E11, CI)

252-E. Moulds and Cores; Types of Drying Systems Available in the Foundry. G. T. Hampton and W. H. Taylor. *Iron and Steel,* v. 24, Apr. 1951, p. 117-121.

Previously abstracted from "Drying of Foundry Moulds and Cores," *Engineering.* See item 153-E, 1951. (E19, E21)

253-E. Basic Principles of Die Design; Provisions for Control of Die Temperature. H. K. Barton and L. C. Barton. *Machinery* (London), v. 78, Mar. 29, 1951, p. 528-535.

Typical arrangements for control of die temperature in die-casting designs. (E13)

254-E. G. & J. Weir's Foundry and Heat-Treatment Facilities. *Foundry Trade Journal,* v. 90, Mar. 29, 1951, p. 333-334, 343.

Plant which manufactures auxiliary machinery for marine and land engineering. (E general, J general)

255-E. Technical Control Emphasized at a Rochester Foundry. *Foundry Trade Journal,* v. 90, Mar. 29, 1951, p. 335-340.

Procedures and equipment of Brit-

ish foundry. Both ferrous and nonferrous castings are produced. (E general)

256-E. Running and Feeding of Castings. H. S. Farmer. *Foundry Trade Journal,* v. 90, Apr. 5, 1951, p. 357-361; disc. p. 361-362.

Materials and design principles, clarified by schematic diagrams. (E23)

257-E. Casting of "Heavy" Metals. (In German.) E. Tofaute. *Giesserei,* v. 38 (new ser., v. 4), Mar. 22, 1951, p. 121-124.

Emphasis on Cu, Zn, Sn, and Pb, especially Cu. Effects of atmospheric moisture and of SO_2 released from coke used as a fuel in crucible melting. Effects of H_2 on properties of the castings. (E general, EG-a)

258-E. Production of Die-Cast Light-Metal Field-Glass Bodies. (In German.) G. Lieby. *Giesserei,* v. 38 (new ser., v. 4), Mar. 22, 1951, p. 128-130.

A Mg alloy containing 9% Mn is used. (E13, T8, Mg)

259-E. Designing Beryllium-Copper Investment Castings. John T. Richards. *Machine Design,* v. 23, May 1951, p. 121-125.

Previously abstracted from *Product Engineering.* See item 104-E, 1951. (E15, Q general, P general, Cu)

260-E. Use of Compressed Air Speeds Production of Die Cast Parts. *Machine and Tool Blue Book,* v. 47, June 1951, p. 138, 140, 142, 146, 148, 150, 154, 156, 158, 160, 162.

Various applications. (E13)

261-E. Metal Penetration. S. L. Gertsman. *Foundry,* v. 79, May 1951, p. 84-89.

For years foundrymen have been seeking to prevent the surface roughness produced when molten metal is forced for a considerable distance into the interstices between the sand grains. Suggests several procedures for correcting the condition. Experimental technique used to determine the effects of various factors. Results obtained with steel castings, with some references to bronze and cast iron. (E25, CI, Cu)

262-E. Lufkin Gray Iron Foundry Serves Industrial Southwest. William G. Gude. *Foundry,* v. 79, May 1951, p. 90-93, 165-166, 168.

Plant located in Lufkin, Tex. (E11, CI)

263-E. Melting Practices for Magnesium Alloys. (Concluded.) K. S. Sealander. *Foundry,* v. 79, May 1951, p. 94-95, 204-207.

Recommended procedures on the basis of work at Aluminum Co. of America. (E10, Mg)

264-E. Aluminum Alloy Die Castings. (Concluded.) Floyd A. Lewis. *Foundry,* v. 79, May 1951, p. 96-100, 230-235.

Die design and construction, design of Al die castings, their trimming, and finishing. Recommendations on inspection and quality control and on how to set up a plant for die-casting production. (E13, Al)

265-E. Olivine Sand Research. Gilbert S. Schaller and W. A. Snyder. *Foundry,* v. 79, May 1951, p. 104-105, 168, 170.

Experiments by the University of Washington with an olivine-base synthetic molding sand. Scarcity of silica-sand deposits on the West Coast, coupled with presence of large deposits of high-quality olivine rock in the state of Washington, prompted the investigation. (E18)

266-E. The Cup, Saucer, and Spoon. Pat Dwyer. *Foundry,* v. 79, May 1951, p. 106-109.

For many years, apprentice foundrymen have been required to make a one-piece casting consisting of above three pieces in their usual positions, before being considered fully trained. Various steps involved in forming the mold for this complex casting. (E19)

267-E. Melting Tin Bronze in Indirect Arc Electric Furnaces. Bruce W. Schafer. *Foundry,* v. 79, May 1951, p. 132, 135.

Recommended procedure. Various types of defects due to poor practice are illustrated. (E10, Cu)

268-E. How to Use the Cupola. Bernard P. Mulcahy. *Foundry,* v. 79, May 1951, p. 180.

Need for accurate weighing of charges and method of calculating charges. (Fifth of a series.) (To be continued.) (E10, CI)

269-E. Properties of Molding Sands. *Foundry,* v. 79, May 1951, p. 182, 184. (E18)

270-E. Die Casting Magnesium Alloys. R. C. Cornell. *American Foundryman,* v. 19, Apr. 1951, p. 75-77.

Recommended procedures, including trimming and finishing. Applications and relative cost factors. (E13, Mg)

271-E. Degas Molten Metals With Inert Gas. E. F. Kurzinski. *American Foundryman,* v. 19, Apr. 1951, p. 78-81.

Equipment and procedures developed by Linde Air Products Co. Since earlier work was reported many improvements have been developed. (E25)

272-E. Core Oil Evaluation Method. A. E. Murton, H. H. Fairfield, and B. Richardson. *American Foundryman,* v. 19, Apr. 1951, p. 85-89.

A comparative investigation of 19 commercial core oils, and several prospective binder materials in the sand laboratories of the Mines Branch at the request of the Steel Castings Institute of Canada. Features include: addition of heating elements at the bottom of the laboratory core oven, and installation of a positive adjustable draft system; a method of assessing core oils by oak-tree contour curves for comparing baking characteristics of two or more binder materials; effects of humid storage on strength of baked cores; and effects of high oven humidities on baked strength of core oils. (E18)

273-E. Evaluate Metal Penetration Variables. S. L. Gertsman. *American Foundryman,* v. 19, Apr. 1951, p. 94-99.

See abstract of "Metal Penetration," *Foundry,* item 261-E, 1951. (E, CI, Cu)

274-E. Small Air Rammers Replace Vibrators. *American Foundryman,* v. 19, Apr. 1951, p. 99.

Core rejections on production runs became negligible after small air-driven scaling tools were substituted for vibrators on a complicated core-drawing job. (E21)

275-E. What's Ahead for Non-Ferrous Foundries in Defense Work? W. A. Mader. *American Foundryman,* v. 19, Apr. 1951, p. 105-106.

Future prospects. Technological as well as economic developments. (E general, A4, EG-a)

276-E. Heat Flow in Moist Sand. Victor Paschkis. *American Foundrymen's Society,* Preprint 51-3, Apr. 1951, 10 pages.

Experiments to obtain some theoretical concepts related to the casting of metals. 17 ref. (E18)

277-E. Improvement of Machinability in High-Phosphorus Gray Cast Iron. Part II. W. W. Austin. *American Foundrymen's Society,* Preprint 51-12, Apr. 1951, 8 pages.

Additional results of an investigation carried out at Southern Research Institute. Foundry-scale applications of desulfurization + Zr-addition treatment, and performance data including cost estimates and results of tool-life machinability tests. 11 ref. (E25, G17, CI)

278-E. Metal Penetration. S. L. Gertsman and A. E. Murton. *American Foundrymen's Society,* Preprint 51-16, Apr. 1951, 8 pages.

Progress in an investigation of metal penetration of green sand cores. Procedure, effect of metal head and temperature, effect of core composition, and effect of silica flour additions. Possible mechanism involved. Metallographic examination. See also item 261-E, 1951. (E25)

279-E. Freezing of White Cast Iron in Green Sand Molds. H. A. Schwartz and W. K. Bock. *American Foundrymen's Society,* Preprint 51-17, Apr. 1951, 5 pages.

Time-temperature relations at the geometric center of white cast iron specimens before, during, and after freezing in green sand molds. (E25, N12, CI)

280-E. Oxidation-Reduction Principles Controlling the Composition of Molten Cast Irons. R. W. Heine. *American Foundrymen's Society,* Preprint 51-18, Apr. 1951, 17 pages.

Principles regulating composition changes in laboratory-melted cast iron. These principles are extended to the cold-melt air furnace melting process employing an acid lining. (E10, CI)

281-E. Compaction Studies of Molding Sands. R. E. Grim and Wm. D. Johns, Jr. *American Foundrymen's Society,* Preprint 51-19, Apr. 1951, 5 pages.

The compaction characteristics of Illinois fireclay, Illinois illite, Wyoming bentonite, and Mississippi bentonite-bonded sands were studied, using varying ratios of sand-clay-water. Compaction characteristics were correlated with differences in gross bulk densities. Relationships among compactability, gross bulk density, maximum green strength, and dry strength. (E18)

282-E. Solidification of Steel From Sand and Chill Walls. H. F. Bishop, F. A. Brandt, and W. S. Pellini. *American Foundrymen's Society,* Preprint 51-21, Apr. 1951, 13 pages.

Experimental thermal studies show that solidification proceeds in wave-like fashion. Thermal characteristics of the mold walls determine rate and mode of travel of these waves. Effects of wall thickness and superheat of the metal. (E25, N12, CI)

283-E. Solidification of Gray Iron in Sand Molds. R. P. Dunphy and W. S. Pellini. *American Foundrymen's Society,* Preprint 51-22, Apr. 1951, 9 pages.

Experimental thermal studies show that solidification proceeds in a wave-like fashion by the travel of "start" and "end-of-freeze" waves. The modifying effects of superheat, carbon equivalent, and sea coal. (E25, N12, CI)

284-E. Scab Defect on Gray Iron Castings. *American Foundrymen's Society,* Preprint 51-23, Apr. 1951, 8 pages.

Progress report of AFS committee gives results of experiments using 47 different sands for the molds. Differences in scabbing and non-scabbing sands are tabulated. Foundry

conditions that promote scabs are listed. (E19, CI)

285-E. Effect of Sand Grain Distribution on Casting Finish. H. H. Fairfield and James MacConachie. *American Foundrymen's Society,* Preprint 51-24, Apr. 1951, 5 pages.

Six different types of sand-grain distribution patterns were produced by blending screened Si sands. Bronze was cast in the molds, which were made with different degrees of ramming, using a precision laboratory molding machine. Results indicated effect of average grain size and of permeability on casting smoothness. The true flowabilities of the different sands are also indicated. (E19, Cu)

286-E. Precoat Materials for Investment Casting. Wm. F. Davenport and Adolph Strott. *American Foundrymen's Society,* Preprint 51-27, Apr. 1951, 8 pages.

Various ceramic oxides, alumina, silica, Zr silicate, and magnesia were evaluated by casting a heat resistant alloy, a stainless steel, and an alloy steel into precoated molds. (E15, AY, SS, SG-h)

287-E. Testing of Sand Under Impact. Wm. H. Moore. *American Foundrymen's Society,* Preprint 51-30, Apr. 1951, 10 pages.

Experiments with a simple apparatus using the Izod impact test. Results were applied to high-temperature behavior of sands. Further results using a more elaborate and substantial piece of equipment. (E18)

288-E. Equipment and Methods of Straightening and Dimensional Inspection of Malleable Iron Castings. Leslie N. Schuman. *American Foundrymen's Society,* Preprint 51-31, Apr. 1951, 7 pages.

(E24, S14, CI)

289-E. Melting Aluminum and Magnesium-Base Alloys. L. W. Eastwood. *American Foundrymen's Society,* Preprint 51-32, Apr. 1951, 12 pages.

Melting practice, including types and selection of melting equipment, furnace designs, selection of pots and crucibles, and maintenance of tools. Various methods of melting these alloys. (E10, Al, Mg)

290-E. Basic Cupola Melting and Its Possibilities. E. S. Renshaw. *American Foundrymen's Society,* Preprint 51-41, Apr. 1951, 6 pages.

Use of a basic-lined cupola as part of a production unit; experience gained in operating with basic slags. Slag conditions which favor desulfurization to low limits also give high carbon pickup in low-carbon charges. The possibility of taking advantages of these factors, with particular reference to nodular iron production. Water cooling as a means of reducing refractory erosion. (E10, CI)

291-E. Some Effects of Temperature and Melting Variables on Chemical Composition and Structure of Gray Irons. E. A. Lange and R. W. Heine. *American Foundrymen's Society,* Preprint 51-47, Apr. 1951, 15 pages.

A study of some fundamental melting phenomena. Variables studied affecting chemical composition were air oxidation in various refractories, effect of temperature on composition changes, influence of slags, Fe oxide, rusty scrap, coke, and results of melting under a CO atmosphere. Structural changes were shown to be related to oxidizing melting conditions. Principles of temperature-dependent chemical reactions causing composition and structural changes. (E10, M27, CI)

292-E. Modern Core Sand Practice. R. H. Greenlee. *American Foundrymen's Society,* Preprint 51-59, Apr. 1951, 5 pages.

How core binders such as resins, and fast baking, highly polymerizing core oils, can be successfully incorporated into a well-balanced core-sand mix which will produce a desirable core. Advantages and disadvantages of each. Results using laboratory batches, are tabulated and plotted. (E18)

293-E. An Investigation of the Penetration of Steel into Molding Sand. Holger Pettersson. *American Foundrymen's Society,* Preprint 51-61, Apr. 1951, 20 pages.

Investigation based on immersion experiments with cylindrical sand "cores" in molten carbon steel in a high-frequency furnace. Shows how rate of penetration varies with time of immersion, metal pressure, temperature and analysis of the steel, grain size of the sand, various additions to the sand, etc. 21 ref. (E25, CI)

294-E. Die Casting Die Design. Part IV. (Continued.) H. K. Barton and James L. Erickson. *Magazine of Tooling and Production,* v. 17, May 1951, p. 52, 54, 56, 58, 100-101, 104.

Runner systems for multiple cavity dies and dies for cold-chamber machines; dies for center-shot, warm-chamber type machines; runner-systems designs; feed design; location of the feed; and gate proper. (E13)

295-E. The Production of Spun Cast Iron Pipes at Australian Iron and Steel Limited, Port Kembla, N.S.W. W. J. Ayre. *Australasian Engineer,* v. 44, Feb. 1951, p. 59-63.

Centrifugal casting process and equipment. (E14, CI)

296-E. Intricate Castings From a Durable Loam Mould. J. Currie. *Foundry Trade Journal,* v. 90, Apr. 12, 1951, p. 383-388; Apr. 19, 1951, p. 419-425.

Equipment and technique used in production of an evaporator-body casting. Durable molds are those which may be used over and over again, with minor repairs and patching. (E19, CI)

297-E. Manufacture of Ingot Moulds for an Indian Steelworks. V. M. McGowan. *Foundry Trade Journal,* v. 90, Apr. 19, 1951, p. 411-416.

The author, without previous personal experience with ingot-mold manufacture, was faced with the necessity for instituting a system for their quantity production in a large jobbing foundry in India. Method by which the job was tackled and layout and equipment developed. (E11, T5, CI)

298-E. Some Curious Wasters. *Iron and Steel,* v. 24, May 1951, p. 168.

Means of discovering causes of faulty castings where the trouble is difficult to track down. (E general)

299-E. The Control of Porosity and Shrinkage Voids; Sound Die-Castings. E. N. Field. *Metal Industry,* v. 78, Apr. 27, 1951, p. 323-326.

Recommended procedures. (E13)

300-E. The Effect of Gray Iron on Grain Size and Strength Properties of Mg Alloys. (In German.) Walter Mannchen. *Zeitschrift für Metallkunde,* v. 41, Nov. 1950, p. 391-393.

Addition of gray iron to the melt has a grain-refining effect on Mg-Al alloys, provided certain conditions are observed. Pure irons have the same effect, but to a much lesser extent. Various methods of refining Mg-Al melts are compared. (E25, Q23, Mg)

301-E. Inclusions Consisting of Different Heavy-Metal Aluminides. (In German.) Franz Eberhard Wittig. *Zeitschrift für Metallkunde,* v. 41, Nov. 1950, p. 394-395.

Methods of counteracting the undesirable effect of these inclusions in Al alloys. Photomicrographs illustrate inclusions resulting from addition of 2% Fe, 1.5% Co, 1% Ni, 2% Fe + 2% Mg, 1.5% Co + 2% Mg, and 1% Ni + 2% Mg. Use of Mg in the last three cases largely minimizes inclusion formation when melting scrap containing the heavy metals. (E25, M29, Al)

302-E. Chill-Mold Casting of Brass. III. (In Dutch.) T. Van Der Klis. *Metalen,* v. 6, Mar. 31, 1951, p. 86-92.

Successful and unsuccessful methods of chill-mold casting, special attention being given to van Piel and Adey's patent, in which, during pouring, the chill mold is moved from a nearly vertical to a horizontal position. (E16, Cu)

303-E. Metal Penetration in Castings. X. Penetration in Special Steel Castings. (In Japanese.) Jiro Kashima. *Journal of the Casting Institute of Japan,* v. 22, no. 12, 1950, p. 1-5.

See abstract of English version from *Japan Science Review,* item 32-E, 1951. (E18, ST)

304-E. Relationship of CO_2 Content of Effluent Gases to Depth of the Coke Bed in the Cupola. (In Japanese.) Kiyoshi Ishikawa and Yasuo Murakami. *Journal of the Casting Institute of Japan,* v. 22, no. 12, 1950, p. 5-11.

(E10, CI)

305-E. "Combination" Castings Made by Casting Fe and Bronze Around Al Bars. (In Japanese.) Seizo Yabuuchi. *Journal of the Casting Institute of Japan,* v. 22, no. 12, 1950, p. 12-15.

The castings were made and their hardness, structure, and machinability determined. Some melting and diffusion takes place. (E16, G17, M27, Q29, Fe, Cu, Al)

306-E. Centrifugally Cast Bronze-Back Bearings for Heavy-Duty Operation. L. N. Tichvinsky. *Transactions of the American Society of Mechanical Engineers,* v. 73, May 1951, p. 391-398.

Performance and salient points of manufacture of centrifugally cast bronze-backed bearings. Sand-cast and centrifugally cast bronzes are compared; advantages of the latter. Methods of rational casting of bearing-back-bronze materials and steps for improvement of their physical properties. (E14, Q general, Cu, SG-c)

307-E. Suffolk Iron Foundry. A. R. Parkes. *Foundry Trade Journal,* v. 90, May 3, 1951, p. 463-472.

Layout, equipment, and procedures of British foundry. (E11, CI)

308-E. Investment Castings Coming Up. *Product Engineering,* v. 22, May 1951, p. 126-127.

New developments, specifically in the frozen-mercury process and plaster casting. (E15)

309-E. Larger Die-Cast Parts. *Product Engineering,* v. 22, May 1951, p. 130.

Examples of trend in die castings resulting from advanced techniques and improved machines. (E13, Al, Mg)

310-E. Investment Casting Conserves Critical Materials. Rawson L. Wood

and Davidlee von Ludwig. *Steel,* v. 128, May 14, 1951, p. 80-82.

By transforming metal into finished parts with a minimum of conversion waste, investment casting can stretch the available supply of strategic materials. Typical parts are illustrated. (E15)

311-E. Scrap Down, Quality Up, Through Statistical Control Systems. Harold H. Johnson. *Steel,* v. 128, May 21, 1951, p. 76-79, 98, 100, 103.

Use in production of steel castings. Control of production rate, correction of core troubles; psychology in work, historical trends, and use of trained specialists.
(E general, S12, CI)

312-E. Accumulator Plate Manufacture. *Metal Industry,* v. 78, May 4, 1951, p. 364-365.

Use of Pb as the principal component of the battery. The material is cast, rolled, and perforated.
(E12, F23, G2, Pb)

313-E. Processing and Salvaging Used Molding Sand, Especially for Steel Castings. (In German.) K. Roesch. *Giesserei,* v. 38 (new ser., v. 4), Apr. 5, 1951, p. 145-149.

Chemical and physical changes of molding sand as the result of high heat and contact with metal. Shows that a large proportion of used molding sand can be successfully reclaimed. (E18, CI)

314-E. Use of Lignite for Melting Pig Iron. (In German.) Nils Sjögren. *Stahl und Eisen,* v. 71, Apr. 12, 1951, p. 388-391.

Experiments proved the possibility of melting pig iron with Styrian lignite in the electric low-stack furnace, also of smelting Styrian ore with Styrian lignite in the oxygen low-stack furnace. Data on composition of the charges are tabulated. (E10, D8, Fe)

315-E. Investigation on Penetration of Liquid Steel in Molding Sand. (In Swedish.) Holger Pettersson. *Jernkontorets Annaler,* v. 135, No. 1, 1951, p. 1-43.

Penetration was studied by immersing cylindrical test pieces of molding sand into liquid steel in a high frequency furnace. The influence of steel composition, temperature, and pressure and of grain size and grain-size distribution of the sand as well as mold composition, ramming density, and sintering temperature was investigated. 22 ref. (E18, E25, ST)

316-E. (Book) **Safety Manual for Die Casting. 1951.** American Die Casting Institute, 366 Madison Ave., New York 17, N. Y. $5.00.

Covers step by step the entire die-casting plant and specific safety procedures. Aimed at the small and medium-sized plant. Presented in a cloth-covered looseleaf binder. (E13)

317-E. Watch Your Cast Iron Chills! F. E. Sutherland. *American Foundryman,* v. 19, May 1951, p. 55-59.

Progressive formation of gas upon pouring a series of castings using the same set of chills was observed. The chills were subjected to critical physical and chemical examination in an attempt to determine the cause and nature of the gas. It was concluded that a set of chills should not be used more than three times, and that the gas is created by reduction of iron oxide by means of carbon. Possibilities of using graphite-free washes, low free-carbon irons, and steel chills. Includes macrographs and micrographs.
(E23, CI)

318-E. Zircon Sand: Properties and Uses in Cores and Facings. Arthur Smith. *American Foundryman,* v. 19, May 1951, p. 64-67.

Technical and economic factors. Procedures and equipment. (E18)

319-E. Factors Affecting Oil-Sand Core Baking. Harry W. Dietert. *American Foundryman,* v. 19, May 1951, p. 67.

(E21)

320-E. Modern Foundry Methods. *American Foundryman,* v. 19, May 1951, p. 68-71.

Procedures and equipment of International Harvester Co.'s Memphis foundry. (E11, CI)

321-E. Discuss Preventing Casting Defects. *American Foundryman,* v. 19, May 1951, p. 81-87.

Informal discussion of a small group of Texas foundrymen who met in San Antonio as guests of *American Foundryman* to consider causes and remedies of several casting defects. (E general)

322-E. Finds Magnesium Will Dephosphorize Molten Iron When Added in Ladle. J. E. Rehder. *American Foundryman,* v. 19, May 1951, p. 95.
(E25, CI, Mg)

323-E. The Plus and Minus of Steel Precision Investment Castings. A. C. Williams. *Materials & Methods,* v. 33, May 1951, p. 88-90.

Guideposts to help indicate when this process should be used with steel and high-temperature alloys. (E15)

324-E. Variations in the Density of Atmospheric Air With Special Reference to the Blowing of Cupola Furnaces. W. J. Driscoll. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Apr. 1951, p. 877-882.

Density of atmospheric air may vary about ±8% from that of standard air. Where a constant reading of a volume gage (e.g., in a cupola air main) is maintained, either manually or automatically, the weight of dry air, and hence of oxygen, may vary by about ±4%. Therefore, use of "constant weight" air-control equipment for cupolas where close control over melting conditions and a high degree of day-to-day reproducibility are required seems desirable. (E10, CI)

325-E. Notes on Cast Iron—Past and Present. E. Longden. *Foundry Trade Journal,* v. 90, May 10, 1951, p. 487-496; May 17, 1951, p. 521-526.

Suggests that too much concentration of attention on the most recent developments is possible, at the expense of solution of the many troubles associated with the more common and special metals in everyday use. The problems referred to are those conducted with microporosity, cavities resulting from liquid shrinkage and gas and solid contraction. The question is posed, "Are discoveries in cast iron varieties outstripping the abilities and resources of the foundry industry?" Second part deals with cupola practice. (E25, CI)

326-E. Design of Castings. (In Dutch). F. B. H. Van Bergen. *Metalen,* v. 6, Apr. 30, 1951, p. 124-132.

Numerous diagrams illustrate general treatise on good molding and casting practice. (E19)

327-E. Pressure Casting of Aluminum Alloys. II. (In French.) R. Grunberg. *Metallurgie et la Construction Mécanique,* v. 82, Nov. 1950, 853, 855-857.

Al-Si-Cu ternary alloys were investigated particularly from the point of view of their applicability to pressure casting. Influence of different factors such as composition, crystal structure, etc., on quality of finished product. (E16, Al)

328-E. Pressure Casting of Zinc Alloys. (In German.) F. Richter. *Giesserei,* v. 38 (new ser., v. 4), Apr. 19, 1951, p. 174-179.

Recommended conditions for the process. Desirable and undesirable results obtained under different conditions. (E13, Zn)

329-E. Use of Sulfite Liquor in the Foundry. (In German.) K. Wittmoser. *Giesserei,* v. 38 (new ser., v. 4), Apr. 19, 1951, p. 181.

Sulfite liquor makes a satisfactory binder for green and dry-sand molds. Compressive strength of the mold greatly increases with density of the liquor. A few disadvantages are indicated. (E18)

330-E. How High Must the Tuyeres of Cupola Furnaces Be Above the Furnace Floor? (In German.) A. Knickenberg. *Giesserei,* v. 38 (new ser., v. 4), Apr. 19, 1951, p. 183.

A reduction in the distance between the tuyere level and the furnace floor increases the temperature of the Fe and reduces its C and S content. (E10, CI)

331-E. Advantages of Copper-Sprayed Cast Iron Core Boxes. (In German.) H. Reininger. *Giesserei,* v. 38, (new ser., v. 4), Apr. 19, 1951, p. 187.

The procedure and several important advantages. (E21, L23, CI, Cu)

332-E. Defects in Castings and Their Origin. (In Swedish.) Jörgen Drachmann. *Gjuteriet,* v. 41, Apr. 1951, p. 51-57.

The Foundry Division of the Swedish Federation of Mechanical Engineering Industries has a committee which has worked on the above problem since 1947. This first report deals with general problems related to such defects, their classification, and fundamental causes. (E25)

333-E. Metal Penetration and Adhesion in Sand Molds. (In Swedish.) Holger Pettersson. *Gjuteriet,* v. 41, Apr. 1951, p. 59-63.

See abstract under similar title from *Jernkontorets Annaler,* item 315-E, 1951. (E18, E25, ST)

334-E. What's Wrong With Castings? John B. Caine. *Foundry,* v. 79, June 1951, p. 106-108, 267-271.

A rebuttal to various claims for superiority of competitive processes over casting for manufacture of metal parts. The principles of design for avoidance or minimization of stress concentration are emphasized. Argues that many of the "rounded" defects, such as pores, blowholes, etc., in castings are actually not as likely to cause failure as are minute cracks typical of wrought metals. Distinction between hot tears and cracks. (E general, S21)

335-E. Rapid Growth Marks Texas Malleable Foundry. William G. Gude. *Foundry,* v. 79, June 1951, p. 110-113, 257-259.

Equipment and procedures of Texas Foundries, Inc., Lufkin, Texas. (E11, CI)

336-E. Design of Coreboxes and Driers for Use on Core Blowers. Elmer Blake. *Foundry,* v. 79, June 1951, p. 114-117, 260-264.

Important factors to be considered. How these parts are made for a typical core. (E21)

337-E. Structural Aspects of Tellurium and Graphite Additions for Chill Control in Cast Iron. Edward A. Loria.

Foundry, v. 79, June 1951, p. 126-129, 212, 214, 216, 218.

Metallographic and physical characteristics resulting from tellurium-graphite additions to a normal chilled iron. Micrographs show structural differences of various levels below the chilled face of commercially made car wheels and changes in chill depth of test blocks caused by variations in amounts of the combined additions. (E25, CI)

338-E. Research and the Pilot Foundry. Harold J. Roast. *Metal Progress*, v. 59, May 1951, p. 668-669.

Recommends use of "pilot" foundries as adjuncts to production foundries, as a means of conducting research for practical foundry problems without interfering with the production line. Refers to bronze foundries, but the arguments seem equally applicable to other types. (E general)

339-E. Phenolic-Sand Molds Cut Costs. *Modern Plastics*, v. 28, June 1951, p. 23.

Builders Iron Foundry, Providence, R. I., furnishes a typical case history to show the reduction in machining time possible by use of phenolic-resin molds. (E18, CI)

340-E. Magnesium Alloys Aid Desulphurization. S. L. Gertsman and B. F. Richardson. *Canadian Metals*, v. 14, May 1951, p. 20-23.

Experiments with induction heating using two methods of introducing a 50-50 Al-Mg alloy, which indicates that S in steel can be consistently reduced by 0.010-0.015%. Initial S content is shown to be unimportant; ductility is improved. (E10, ST, Al, Mg)

341-E. Loam Moulding of Pump Casings and Impellers. E. Clipson. *Foundry Trade Journal*, v. 90, May 17, 1951, p. 515-520; May 24, 1951, p. 547-550; disc., p. 550-551.

The making of a turbine impeller of the double-entry, shrouded pattern type, and also, of a volute section of a 102-in. centrifugal pump both produced by loam molding. (E11, CI)

342-E. Melting of Light Alloys; Factors Controlling Selection of Furnace. W. Geuthner. *Metal Treatment and Drop Forging*, v. 18, May 1951, p. 226-229.

(E10, Al, Mg)

343-E. Chill-Mold Casting of Brass. IV C. Several Frequently Occurring Defects in the Casting and Means of Prevention. (In Dutch.) T. Van der Klis. *Metalen*, v. 6, May 1951, p. 143-151.

Defects due to faulty pouring, trapped gases, and improper solidification and cooling conditions, also difficulties of removing the castings from the mold. Causes of such defects and possible remedies. (E23, E25, Cu)

344-E. Definition and Classification of Foundry Defects of Metallurgical Origin. (In French.) Albert Portevin. *Fonderie*, Feb. 1951, p. 2345-2357; disc., p. 2357-2358.

Defects in finished foundry products classified according to their origin; i.e., resulting from incorrect metallurgical treatment or from faulty casting technique. Methods for eliminating such defects. 11 ref. (E25)

345-E. Devices for Charging Small Capacity Cupolas. (In French.) *Fonderie*, Feb. 1951, p. 2363-2365.

A series of simple devices makes it possible to eliminate to a great extent the manual charging operation. (E10, CI)

346-E. Economical Molds for Pressure Casting. (In French.) Maurice Billing. *Fonderie*, Feb. 1951, p. 2368-2373.

Advantages of using bronze molds instead of the much more expensive steel molds for small series of castings. Bronze suggested contains, besides Cu, about 10% Al, 4-6% Ni, 2-4% Fe, and small additions of other elements, such as Mn. (E13, T5, Cu)

347-E. Production of Chill Molds. Part I. Literature Review. (In German.) E. Feil. *Giesserei*, v. 38 (new ser., v. 4), May 3, 1951, p. 205-210.

Numerous factors that affect the life-span of chill molds. 57 ref. (E19, CI)

348-E. Slag Control in the Cupola. (In German.) E. Witten. *Giesserei*, v. 38 (new ser., v. 4), May 17, 1951, p. 221-227.

Theoretical principles; effect of basicity and Al_2O_3 content on Fe and Mn content; the desulfurization process; C and Si contents of the metal bath with slags of different basicity; and effects of fluorspar, furnace lining, and additions to the melt. 17 ref. (E10, B21, CI)

349-E. High-Vacuum Metallurgy. (In German.) H. W. Flemming. *Metall*, v. 5, May 1951, p. 188-192.

Different types of vacuum furnaces for melting of metals. (E10)

350-E. Induction-Heated Spoutless Crucible Melting Furnace. (In German.) P. Müller. *Metall*, v. 5, May 1951, p. 192-195.

Furnace is shown to have important advantages over other furnaces in the melting of Mg and its alloys, and other low-melting metals. (E10)

351-E. Centrifugal Steel Castings. J. Taylor and D. H. Armitage. *Aircraft Production,* v. 13, June 1951, p. 167-169.

See abstract of "Centrifugal Steel Castings for Gas Turbines," *Foundry Trade Journal;* item 200-E, 1951. (E14, S13, CI)

352-E. Problem in Gray Iron Molding. J. W. Birks. *American Foundryman,* v. 19, June 1951, p. 34-37.

Details of pattern construction and molding method for a gray-iron still casting which must be sound in order to withstand high pressures in service. Poured weight of the casting is approximately 3300 lb., and cleaned weight 3060. (E11, CI)

353-E. Factors Governing Sea Coal Selection and Control. E. C. Zirzow. *American Foundryman,* v. 19, June 1951, p. 45-47.

Sea coal is a term used to describe any pulverized coal used in foundry molding sands. It is manufactured by grinding or pulverizing coal using various types of mills. Fineness is controlled by screening or air flotation. Reaction when molten metal enters a mold containing sea coal, four functions of sea coal and theories of mechanism of action. (E18)

354-E. Modern Foundry Methods . . . Straighten Malleable Iron Castings. *American Foundryman,* v. 19, June 1951, p. 48-49.

Inspection and straightening methods employed in a malleable foundry producing automotive castings are presented in outline form from the paper "Equipment and Methods of Straightening and Dimensional Inspection of Malleable Iron Castings," by Leslie N. Schuman, presented at 55th AFS Annual Meeting, Buffalo, Apr. 23-26, 1951. (E24, S13, CI)

355-E. Bentonite Bonding Properties Affected by Drying Temperature and Moisture Content. F. L. Cuthbert and T. M. Cuthbert. *American Foundryman,* v. 19, June 1951, p. 50-51.

Limited to the so-called Western bentonites. (E18)

356-E. Production of Heavy Castings for Electrical Generating Equipment. N. Charlton. *Institute of British Foundrymen,* Advance Paper 1001, 1951, 8 pages.

Procedures and equipment of British firm. (E11, CI)

357-E. Relationship Between Modern Foundry Methods and the Quality of Castings. F. R. Elliott. *American Society of Mechanical Engineers;* Advance Paper 51-S-20, 1951, 8 pages.

A general discussion. (E general)

358-E. What is Foundry Sand? Douglas C. Williams. *American Society for Mechanical Engineers,* Advance Paper 51-S-23, 1951, 7 pages.

Types, properties, and applications. (E 18)

359-E. Report of Committee B-6 on Die-Cast Metals and Alloys. J. R. Townsend, chairman. *American Society for Testing Materials,* Preprint 11, 1951, 27 pages.

Consists largely of a paper entitled, "Aluminum Die Castings—The Effect of Process Variables on Their Properties", by W. Babington and D. H. Kleppinger. A test casting die was specially designed in which pressures of 500-100,000 psi. and gate thicknesses of 0.030 and 0.090 in. can be used. Special instrumentation was developed for measuring and recording true molten-metal pressure, die-face temperatures, and plunger speeds. A relationship is established between radiographic soundness and tensile strength by which maximum tensile strength may be predicted from soundness ratings. (E13, Al)

360-E. Manufacture of Centrifugally Cast Iron Pipe. *Industrial Heating,* v. 18, June 1951, p. 1008, 1010, 1012-1014, 1016, 1018, 1022.

At plant of American Cast Iron Pipe Co., Birmingham. (E14, CI)

361-E. Modern Foundry With Comprehensive Production Facilities. *Light Metals,* v. 14, June 1951, p. 346-350.

British foundry which produces miscellaneous ferrous and non-ferrous castings. (E general)

362-E. Casting-In of Inconel Tubes in Copper Blocks. F. J. Lambert. *Metal Progress,* v. 59, June 1951, p. 809-811.

Difficulties experienced in successful conduct of this operation which is used in construction of electrical heaters for the electromagnetic method of separation of U isotopes. The elements consisted of Nichrome filaments centered in welded Inconel tubes and insulated from them by means of tamped magnesia. Frequently these heaters have failed after only a short period. Effect of heater position in the mold on the casting; effect of surface preparation of the Inconel tubing on adherence to the Cu-alloy casting; and relative merits of seamless tubing and welded tubing were studied. (E11, Ni, Cu)

363-E. Forgeable Arc-Melted Tungsten. Harry B. Goodwin and Charles T. Greenidge. *Metal Progress,* v. 59, June 1951, p. 812-814.

Procedures and equipment developed at Battelle Memorial Institute. The technique used was similar to that for Mo. It consisted of arc melting in a water-cooled crucible

which also acted as the ingot mold. The product was found to be forgeable, although metal produced by powder-metallurgy methods is not. Greater purity is believed to be responsible. (E10, W)

364-E. Centrifugal Castings for Turbines. *Metal Progress,* v. 59, June 1951, p. 868, 870. (Condensed from "Centrifugal Steel Castings for Gas Turbines", J. Taylor and D. H. Armitage, *Iron and Steel Insttiute,* "Symposium on High Temperature Steels and Alloys for Gas Turbines," Feb. 1951, p. 205-208.)

Previously abstracted from condensed version in *Foundry Trade Journal.* See item 200-E, 1951. (E14, CI)

365-E. Investment Casting. *Metal Progress,* v. 59, June 1951, p. 874, 876, 878. (Condensed from "Investment Casting of Nozzle Guide Vanes", H. E. Gresham and A. Dunlop, *Iron and Steel Institute,* "Symposium on High-Temperature Steels and Alloys for Gas Turbines," 1951.)

Procedure and recommendations, including composition of a suitable spray-coat mixture, a suitable refractory, and a good bonding liquid. (E15)

366-E. Loam and Dry-Sand Moulding for a Crane Barrel. Terry Walton. *Foundry Trade Journal,* v. 90, June 7, 1951, p. 611-613.

Step-by-step description of the making of a large hollow barrel-shaped casting. (E19, CI)

367-E. Valve Tappet Castings. René Dulché. *Foundry Trade Journal,* v. 90, June 7, 1951, p. 597-605.

General characteristics, and method of manufacture adopted in a French foundry. Covers requirements of patterns, chills, and molding boxes; molding; coremaking; mold assembly, closure, and metallurgy; and finishing with fettling and control. Foundry layout and organization. (E11, CI)

368-E. Thermal Considerations in Foundrywork. Victor Paschkis. *Institute of British Foundrymen,* Advance Paper 995, 1951, 14 pages.

Fundamentals of heat transfer by analogy to flow of liquid metals. Practical consequences of heat transfer theory as applied to foundry problems. Some methods of making thermal studies and application of the mass-flow analyzer (a computing machine) to prediction of results of metal-solidification tests. Problems needing further research. (E25)

369-E. Some Present-Day Practices in Patternmaking. B. Levy. *Institute of British Foundrymen,* Advance Paper 999, 1951, 8 pages. (E17)

370-E. Manufacture of Propellers and Other Castings. C. W. Stewart. *Institute of British Foundrymen,* Advance Paper 1002, 1951, 8 pages.

Procedures and equipment of British ferrous foundry. (E11, CI)

371-E. Casting Characteristics of Some Aluminium Alloys. D. C. G. Lees. *Institute of British Foundrymen,* Advance Paper 1004, 1951, 13 pages.

Results of investigation of 16 different Al alloys for founder's fluidity; susceptibility to hot-tearing; susceptibility to internal shrinkage defects; and susceptibility to external shrinkage defects. (E25, Al)

372-E. Die-Casting the "Squirrel Cage" on Small Induction Motors. *Machinery Lloyd* (Overseas Edition), v. 23. May 26, 1951, p. 102-104.

Equipment and procedures. Material is Al. (E13, T1, Al)

373-E. Crucibles in the Aluminium Foundry. (In French and German.) R. Irmann. *Aluminium Suisse,* May 1951, p. 75-81.

Compositions, uses, and relative efficiencies of graphite, carborundum, and Fe crucibles. The Fe crucible is recommended only when protected from molten Al and flux by a surface coating. (E10, T5, C-a, Fe, Al)

374-E. Lead Bronzes and Methods for Casting Them on Steel Bearing Shells. (In Polish.) M. Schneider and S. Balicki. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 2, 1951, p. 115-148.

Investigations on centrifugal, static, and diffusion methods indicate that the latter is unsatisfactory for three different reasons. Experiments led to improvement of the static and centrifugal methods. 18 ref. (E16, Cu, CN, SG-c)

375-E. Induction Furnaces Reduce Die-Casting Rejects. Harry Phillips. *American Machinist,* v. 95, July 9, 1951, p. 136-138.

The furnaces and their use, especially in the melting of Al and Zn. (E13, Al, Zn)

376-E. Recent Progress in the Foundry Industry. Colin Gresty. *Engineering,* v. 171, June 22, 1951, p. 770-771. (A condensation.)

Brief review. (E general)

377-E. Need Stronger Foundry Coke. H. W. Lownie, Jr. *Foundry,* v. 79, July 1951, p. 72-76.

Research which has been conducted since 1942 by Gray Iron Research Institute at Battelle Memorial Institute on effects of coke properties on cupola operation. Test results obtained in a Ford Motor Co. foundry cupola, and results of a letter survey of coke needs of 21 gray-

iron foundries. Comparative tests on 1942 and 1950 cokes showed significant differences in tapping temperatures and carbon pickup by the iron. Concludes that many of the foundryman's operating difficulties could be reduced if he were supplied with a larger and stronger coke. (E10, CI)

378-E. Gas Evolution From Molds and Cores. William H. Moore. *Foundry,* v. 79, July 1951, p. 80-87.

Factors influencing the above, including moisture and underbaked cores, and their effect on castings. A relatively simple method of measuring the amount of gas from any sand mix for molds and cores. (E18)

379-E. Wedges Effective in Fastening Pins and Clamps. Pat Dwyer. *Foundry,* v. 79, July 1951, p. 98-99.

Simple devices for fastening foundry flasks together without use of nuts, bolts, or screws. (E17)

380-E. Shell Molded Parts Are Machined 30% Faster. *Steel,* v. 129, July 9, 1951, p. 82.

30-40% of normal machining time is reported to be saved on production of Meehanite machine parts cast by the shell molding, or Croning process. This technique employs thin, shell-like, single-use molds made of sand bonded with Bakelite phenolic resins. (E18, CI)

381-E. Investment Casting. B. G. Mackenzie. *Canadian Metals,* v. 14, June 1951, p. 20-21.

Method for producing small parts from any castable alloy is adaptable to intricate shapes and close tolerances, giving smooth-surface, high-density products. (E15)

382-E. Valve Tappet Castings Manufactured in a French Foundry. René Dulché. *Iron and Steel,* v. 24, June 1951, p. 204-210.

Previously abstracted under similar title in *Foundry Trade Journal.* See item 367-E, 1951. (E11, CI)

383-E. Foundry Mechanization; Successful Application to the Jobbing Foundry. A. S. Beech. *Iron and Steel,* v. 24, June 1951, p. 211-214. (A condensation.)

Procedures, facilities, and layout of mechanized job-lot foundries. (E general)

384-E. Improving Cutting Tool Efficiency. *Machinery Lloyd* (Overseas Ed.), v. 23, June 9, 1951, p. 91-93.

Production by casting of toolsteel. Data show that cast cutters are actually superior to ordinary high-speed steel cutters machined from a solid block. (E11, T6, TS)

385-E. Synthetic Resins in the Foundry. P. G. Pentz. *Metal Industry,* v. 78, June 22, 1951, p. 504-507.

Properties considered necessary in a resin-bonded core sand. (E18)

386-E. "Jacket" Sand Molding. (In French.) *Fonderie,* Mar. 1951, p. 2392-2405.

Advantages of the method when it is necessary to stock large quantities of molds. The molds are released from the flasks after making, and before casting the metal. (E19)

387-E. Introduction of Scrap Steel Into Cupola Furnaces. (In French.) *Fonderie,* Mar. 1951, p. 2406-2408.

Direct introduction into the charge. Chemical and physical properties of the scrap chosen. (E10, A8, CI)

388-E. High-Quality Cast Steel From the Small Converter. (In German.) A. Lincke. *Giesserei,* v. 38 (New ser., v. 4), May 31, 1951, p. 258-259. (E10, CI)

389-E. A New High-Efficiency Automatic Die Casting Machine for Lead, Tin, Zinc, and Aluminum Alloys. (In German.) H. Fleckseder. *Metall,* v. 5, June 1951, p. 247-250.

Dewin's machine, which can be used for low-melting heavy metals and for Al and its alloys with equal success. (E13, Pb, Sn, Zn, Al)

390-E. Gating Principles Applied to Gray Iron Castings Produced on Match Plates. A. J. Howarth. *American Foundryman,* v. 20, July 1951, p. 28-32.

Gating principles and proper and improper applications to several groups. (E22, CI)

391-E. Cast Stainless Steel in Ceramic Molds. H. Czyzewski, R. L. Cook, P. Frederick, and J. P. Jero. *American Foundryman,* v. 20, July 1951, p. 38-39.

Pressed and fired ceramic molds were found to produce stainless steel test bars of good finish, fine detail, and dimensional accuracy. Methods and ceramic compositions used, poured mold characteristics, and test bar properties obtained in the preliminary experiments, and effects of mold preheating. A high alumina-ball clay mixture appeared to be the most satisfactory of the five ceramic compositions tested. (E16, SS)

392-E. Modern Foundry Methods: Planning Mechanization for Medium-Size Gray Iron Foundries. *American Foundryman,* v. 20, July 1951, p. 40-45. (Based on paper by Henry W. Zimnawoda, to be published in *Transactions of the American Foundrymen's Society,* v. 59, 1951.)

Includes brief text, plus numerous diagrams and illustrations. (E11, CI)

393-E. Applying Research Findings in the Malleable Iron Shop. J. E. Rehder. *American Foundryman,* v. 20, July 1951, p. 51-56.

Some of the more important practical aspects of melting and annealing. Effects of tramp metals in the melt, particularly tin, upon properties and annealability of the iron; carbon, silicon and sulfur control; melt additions; acid and basic furnace refractories; and first and second-stage annealing practices. (E11, J23, CI)

394-E. Core Strength Variations Due to Oven Humidities. Harry W. Dietert and Alex L. Graham. *American Foundryman,* v. 20, July 1951, p. 58-59.

How core-strength variations and quantities of binders necessary have been reduced by establishing absolute humidity values in core-oven atmospheres for baking various core mixtures. (E18)

395-E. Thermal Considerations in Foundrywork. Victor Paschkis. *Foundry Trade Journal,* v. 90, June 21, 1951, p. 661-667; June 28, 1951, p. 699-703, 708.

Previously abstracted from *Institute of British Foundrymen,* Advance Paper 995, 1951. See item 368-E. (E25)

396-E. Casting Characteristics of Some Aluminium Alloys. D. C. G. Lees. *Foundry Trade Journal,* v. 90, June 28, 1951, p. 687-697, 708.

Previously abstracted from *Institute of British Foundrymen,* Advance Paper 1004, 1951. See item 371-E. (E25, A1)

397-E. New Process Quickly Removes Surface Defects on Castings. *Iron Age,* v. 168, July 19, 1951, p. 101.

Sand encrustations, fins, pads, chaplets or chill nails, and other forms of excess metal are removed from castings quickly, easily, and economically by means of an oxy-acetylene method developed by Linde Air Products Co. The new process, called Powder-Washing, utilizes a special blowpipe. An Fe-rich powder is fed through oxy-acetylene preheat flames into a low-velocity oxygen stream where it burns and produces superheated liquid iron oxide. (E24, G22)

398-E. Basic Principles of Die Design; Relating Die Design to Dimensional Accuracy. H. K. Barton and L. C. Barton. *Machinery* (London), v. 78, June 29, 1951, p. 1079-1086.

Correlation of die-casting die design with the standards of dimensional accuracy demanded in the finished product. (Concluded.) (E13)

399-E. Synthetic Resins in the Foundry. *Machinery Lloyd* (Overseas Ed.), v. 23, June 23, 1951, p. 79, 81, 83, 85-86. (From report and recommendations of Sub-Committee T.S. 30, Technical Council, Institute of British Foundrymen.) (E18)

400-E. Trends in Modern Cupola Construction. (In German.) Jorgen Drächmann. *Gjuteriet,* v. 41, June 1951, p. 83-88.

Shows that conditions for equilibrium never exist in cupolas, but that calculations based on incomplete equilibrium are possible. Improvement of present construction. (E10)

401-E. Synthetic Resins in the Foundry. *Foundry Trade Journal,* v. 91, July 5, 1951, p. 3-9.

The use and development of synthetic resins for core binders, molding sands, and other foundry applications. Technical and economic aspects and relation to comfort and health. (E18)

402-E. Chemical Chilling and Feeding. J. E. R. Tompkin. *Foundry Trade Journal,* v. 91, July 5, 1951, p. 11-33; disc., p. 13, 16.

Orthodox chilling, tellurium chilling, feeding, and exothermic feeding. (E23)

403-E. Valve Tappet Castings. *Foundry Trade Journal,* v. 91, July 5, 1951, p. 14-16.

Discussion of R. Dulché's paper on the above, which appeared in the June 7 issue. See item 367-E, 1951. (E11, CI)

404-E. The Solidification of Bronze Castings. *Industrial Heating,* v. 18, July 1951, p. 1196.

Results obtained in a long-term study. (A review of a paper by R. W. Ruddle, presented before the British Institute of Metals.) (E25, Cu)

405-E. Microwave Components: Precision Castings vs. Electroforming. A. A. Feldmann. *Materials & Methods,* v. 34, July 1951, p. 70-72.

Waveguides are special precision tubes, which may be straight sections, bends, twisted shapes, tapered sections, transition pieces from round to rectangular cross-sections, and multi-armed junctions. Various kinds of precision casting and electroforming are used, depending on the exact shape, the tolerances, and number of pieces on order. (E13, E15, L18)

406-E. Steel Castings and Welding Can Be Combined Successfully. Philip O'Keefe. *Materials & Methods,* v. 34, July 1951, p. 73-75.

Parts fabricated by welding together several steel castings or a combination of cast and wrought pieces. Design principles, welding specifications, and welding practice. (E general, K general, CI)

407-E. Founding Light Alloys. *Metal Industry,* v. 79, July 6, 1951, p. 13.

Summarizes the results of a study

of 16 light alloys, listing the characteristic casting properties and most useful applications of each. (E general, Al)

408-E. Porosity and Blistering in Pressure Casting. (In French.) *Métallurgie et la Construction Mécanique*, v. 83, May 1951, p. 357, 359, 361, 373.

Choice of alloy for pressure-cast pieces. Machining, influence of molding conditions, and control of porosity. Many different kinds of alloys are considered. (E16)

409-E. How to Use the Cupola. Bernard P. Mulcahy. *Foundry*, v. 79, July 1951, p. 186, 188; Aug. 1951, p. 184, 186, 188.

Characteristics of foundry coke and the requirements of a fuel for satisfactory use. Aug. issue: recommended procedure for adjusting and burning-in the coke bed. (7th and 8th in a series. To be continued.) (E10, CI)

410-E. Some Recent Developments in Centrifugal Casting. M. L. Samuels and A. E. Schuh. *Foundry*, v. 79, July 1951, p. 78-79, 218, 220, 222, 224, 226; Aug. 1951, p. 84-89.

Recent advances in the field of centrifugal casting, particularly in the method employing metal molds. Concluding article: applications of dual-metal castings in which dissimilar metals are cast successively within a centrifugal mold. (E14, SS, CN, CI)

411-E. Beryllium Copper Sand Castings. John T. Richards. *Foundry*, v. 79, Aug. 1951, p. 90-93, 241-242, 244, 247-248, 250-256.

Foundry practice, engineering properties, structure, and uses of the four commercial Be-Cu sand casting alloys. (E11, Cu)

412-E. New Chromium Alloy Neutralizes Effect of Varying Cooling Rate in Gray Iron. Ralph A. Clark. *Foundry*, v. 79, Aug. 1951, p. 94-97.

Experience has indicated that an excellent balance between machinability and satisfactory resistance to wear can be obtained in castings treated with the new Si-Cr alloy. Addition of this alloy has proved a thoroughly practical method of obtaining increased uniformity of hardness with a consistently pearlitic structure in this type of casting. (E25, Q9, G17, CI, Cr)

413-E. Impact Strength of Sands. Harry W. Dietert. *Foundry*, v. 79, Aug. 1951, p. 150-151.

The green compressive strength test together with green deformation gives more detailed information as to the workable strength of molding sands in a single package. These two test results allow control of bond strength and plasticity separately. Data on compressive, tensile, shear, and impact strength of five foundry sands are graphed and tabulated. (E18)

414-E. Centrifugal Casting of Pipe in Sand-Lined Molds. K. R. Daniel. *Mechanical Engineering*, v. 73, Aug. 1951, p. 644-650.

Early history, equipment, and methods. (E14, CI)

415-E. 20 mm. Fuze Noses Zinc Die Cast at High Speed. *Steel*, v. 129, Aug. 13, 1951, p. 78-79.

Process and fast plunger-type machines which cast 2700 noses per hr., meeting close ordnance specifications for structural soundness and dimensional accuracy. (E13, Zn)

416-E. Designing Parts for High Level Production by Precision Investment Casting. *Product Engineering*, v. 22, Aug. 1951, p. 136-138.

Nine examples of complex machine parts currently being mass produced to close tolerances. (E15)

417-E. Gray Iron Castings. R. L. Collier. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 378-385.

Historical sketch; methods and techniques; mechanical properties of gray iron. (E 11, Q general, CI)

418-E. Malleable Iron Castings. James H. Lansing. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 386-397.

Methods and equipment employed in production. Mechanical properties and applications. (E11, CI)

419-E. Steel Castings. Charles W. Briggs. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 398-409.

Equipment and procedures for production. (E11, CI)

420-E. High Alloy Steel Castings. W. H. Worrilow. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 410-419.

Equipment and procedures for production. (E11, CI)

421-E. Running and Feeding of Castings. H. S. Farmer. *Canadian Metals*, v. 14, July 1951, p. 18-22, 48.

Practical approach to the design of runners and feeders which will help to control foundry practice and thereby reduce scrap. (E23)

422-E. Solder—Cast Automatically. *Canadian Metals*, v. 14, July 1951, p. 46.

How molten metal is withdrawn from bottom of melting kettle and cast in a closed mold. Result is a uniform solder, oxide and dross-free. (E12, SG-f)

423-E. The Estimation of Die Casting Production Rates. H. K. Barton.

Machinery (London), v. 79, July 26, 1951, p. 158-164.

A method applicable to the estimation of production rates and to a number of other variables involved. (E13)

424-E. Some Present-Day Practices in Patternmaking. B. Levy. *Foundry Trade Journal,* v. 91, July 19, 1951, p. 57-64.

An illustrated survey. (E17)

425-E. Problems in Castings Production. *Foundry Trade Journal,* v. 91, July 19, 1951, p. 71-74.

Round-table discussion of several miscellaneous problems. (E general)

426-E. Mass Production of Castings. William Czygan. *Foundry Trade Journal,* v. 91, July 26, 1951, p. 105-106.

Efficient handling and extensive mechanization enable a permanent-mold foundry to produce a large number of grey iron castings. (E12, CI)

427-E. Observation and Control of Dust in Foundry Dressing Operations. Part I. Control of Dust. R. F. Ottignon. **Part II. Observation of Dust.** W. B. Lawrie. *Institute of British Foundrymen,* Paper 1008, 1951, 20 pages.

New methods to observe and control the dust cloud generated during foundry dressing operations. Application of local exhaust ventilation to the dressing of small and medium-size castings. Results indicate that increased efficiency may be attained by using an air jet to control direction in which the dust cloud flows. (E24)

428-E. Mechanical Charging of Cupolas; Survey of Methods in Use and Principles Involved. W. J. Driscoll. *Institute of British Foundrymen,* Paper 1009, 1951, 23 pages.

14 references. (E10, CI)

429-E. Centrispun High-Alloy-Steel Aero-Engine Components. A. E. Thornton and J. I. Morley. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 189-205.

Part I: The Centrispinning process and its advantages and limitations from a metallurgical viewpoint. Results of mechanical tests. Part II: Physical and mechanical properties of a typical casting made by the Centrispinning process. The steels used contained 18-25% Cr and 8-14% Ni. (E14, Q general, AY)

430-E. Centrifugal Steel Castings for Gas Turbines. J. Taylor and D. H. Armitage. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951. p. 205-208.

Evolution of production and fields of application of the horizontal and vertical axis methods. Method of manufacture and stringent inspection procedure applied. Results of mechanical tests on the castings. (E14, Q general, ST)

431-E. Investment-Casting of Nozzle Guide Vanes. H. E. Gresham and A. Dunlop. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 209-212.

Modern development of the old "lost wax" process of casting as applied to the manufacture of nozzle guide vanes for gas turbines. Factors affecting dimensional accuracy and some of the creep properties of investment-cast alloys suitable for nozzle guide vanes. (E15, Q3, AY)

432-E. Precision-Casting of Turbine Blades. E. R. Gadd. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 212-216.

Turbine blade castings made successfully by the "lost wax" precision-casting method. Casting defects likely to be met, and their causes. The high-temperature fatigue properties of cast alloys, and a laboratory method for determining the resistance to thermal shock. (E14, Q7, AY)

433-E. Application of Bituminous Sand in Foundry Work. (In Portuguese.) Carlos Dias Brosch and Heitor Correa Goncalves. *Boletim da Associao Brasiliera de Metais,* v. 6, Oct. 1950. p. 366-377.

Characterizes type, application, and advantages of bituminous sand. (E18)

434-E. Problem of Gases in Aluminum and Its Alloys. (In Portuguese.) Clovis Bradaschia. *Boletim da Associcao Brasiliera de Metais,* v. 7, Jan. 1951, p. 20-35.

Role of H_2 in formation of pinholes, mechanism of their formation, and methods for elimination of gases. 26 ref. (E25, Al)

435-E. Acicular Cast Iron. (In Portuguese.) Lino A. de Lacerda Santos. *Boletim da Associcao Brasiliera de Metais,* v. 7, Jan. 1951, p. 49-65.

Criteria for obtaining best type of cast iron and for improving mechanical properties by controlling the structural components. (E25, CI)

436-E. Production of a Monobloc Type Double-Plate Aluminum Mold for Sand Casting. (In French.) Pierre Rodicq. *Fonderie,* v. 64, Apr. 1951, p. 2439-2446.

Mold is used in series on concussion machines. Advantages and disadvantages. (E10, T5, Al)

437-E. Measuring the Foundry Properties of Metals and Alloys. (In French.) Raymond Guillemot. *Fonderie,* v. 65, May 1951, p. 2459-2465.

Special divided crucible and testing apparatus for measuring fluidity, shrinkage, cavitation and other properties. 10 ref. (E10, E25)

438-E. Use of Electric Furnaces in Foundry Work With Copper Alloys. (In French.) Georges Blanc. *Fonderie,* v. 65, May 1951, p. 2467-2480.

Low and high-frequency induction, arc, radiant resistance, and resistance furnaces utilizing a crucible. (E10, Cu)

439-E. Tightness Control in French-Made Heating Equipment. (In French.) Georges Ulmer. *Fonderie,* v. 65, May 1951, p. 2481-2486.

Effect of tightness of foundry furnaces on their performance, and equipment for measuring leaks. (E10)

440-E. Removal of Slag From Cupola Furnaces. (In French.) *Fonderie,* v. 65, May 1951, p. 2487-2492.

Method of removal depends on whether slag is or is not granular. Various kinds of equipment used. (E10, CI)

441-E. Nodular Graphite Cast Irons. (In Italian.) Luigi Nava. *Metallurgia Italiana,* v. 43, June 1951, p. 221-240.

Recent industrial applications. They are easily produced, and have good properties. Treatment with Mg. 69 ref. (E25, CI, Mg)

442-E. Gray-Iron Crucible in the Aluminum Foundry. (In German.) C. Englisch. *Giesserei,* v. 38, June 14, 1951, p. 281.

Proper use of the above. (E10)

443-E. Plant Experiences and Their Application to the Hot-Blast Cupola. (In German.) O. Mattern. *Giesserei,* v. 38, June 14, 1951, p. 269-273.

Experimental results obtained from a hot-blast cupola furnace and results of a study on behavior of CO-containing stack gas. Shows how these results can profitably be applied in the operating plant. Criteria for installation of hot-blast furnaces. Experimental procedure and results. (E10, CI)

444-E. Composition of the Charge of Cast Iron. (In German.) F. A. Ebert. *Giesserei,* v. 38, June 28, 1951, p. 307-308.

Various kinds of scrap used in melting cast iron, and effect of various additions; factors in production of satisfactory cast iron. (E10, CI)

445-E. Casting a Molded Body of Aluminum Bronze. (In German.) J. Knieps. *Giesserei,* v. 38, June 28, 1951, p. 308-309.

Described and illustrated. (E11, Cu)

446-E. Determination of the Mechanical Properties of Cast Aluminum Alloys. (In German.) G. Gürtler. *Giesserei,* v. 38, July 12, 1951, p. 320-324.

Casting temperature, gas content, rate of solidification, tests on cast pieces, breaking tests, and suggestions for other tests. (E25, Q general, Al)

447-E. Melting of Copper and Its Al Alloys. (In German.) A. Fink. *Giesserei,* v. 38, July 12, 1951, p. 333-335.

Techniques for overcoming difficulties met in melting. (E10, Cu)

448-E. Recent Work on Pressure Cast Zinc Alloys. (In German.) K. Lohberg. *Metall,* v. 5, July 1951, p. 282-288.

Shows that Ph, Sn, or Cd impurities decrease resistance of Zn alloys to H_2 corrosion, and that salts are ineffective in removing impurities. Superheating likewise increases oxidation and Fe content of pressure castings, but up to 6.6% Cu has no effect on aging resistance of alloys. Physical properties and photomicrographs. 16 ref. (E13, R2, Zn)

449-E. Zirconium Alloy as Manganese Substitute in Gray Cast Iron. Warren C. Jeffery. *American Foundryman,* v. 20, Aug. 1951, p. 46-50.

Ladle or cupola additions of Zr as Zr-Fe-Si alloy to gray cast iron were effective in controlling sulfur, reducing hardness and chilling tendencies, and increasing machinability. The reported effects of Zr in cast iron indicate the alloy is a satisfactory substitute for the commonly used Mn inoculant. (E25, CI, Zr)

450-E. Cast Magnesium Rotor Stands High Speeds, Shocks, Stresses. *American Foundryman,* v. 20, Aug. 1951, p. 51-52.

A cast Mg rotor now in use in a flour mill. Methods used in its construction and mechanical properties of the rotor. (E11, Q23, Mg)

451-E. Cast Metal Gears. *American Machinist,* v. 95, Aug. 20, 1951, p. 111.

Shell molding and several other new casting methods currently being tried for gears. Uses of die and investment casting. Miscellaneous ferrous and nonferrous metals are used. (E general, T7)

452-E. Bibliography on Melting and Casting of Refractory Metals Including Some References on Vacuum Technology (1946-1950). *Canada Dept. of Mines and Technical Surveys,* Information Memorandum No. 304, Jan. 15, 1951, 8 pages.

(E general, C5, Ti, Zr, EG-d)

453-E. The Timed Jolt. H. J. Bullock. *Foundry Trade Journal,* v. 91, Aug. 2, 1951, p. 125-127.

Pre-set numbering of jolts on machines which incorporate this method of ramming. The device forms an integral part of the machine. Also the way such an innovation can be used to improve the consistency of molds and, as a result, surfaces of castings. Correct number of jolts required to suit each particular pattern plate can be determined and recorded for future use. (E19)

454-E. Castings for the Corliss Steam Engine. D. Redfern. *Foundry Trade Journal,* v. 91, Aug. 9, 1951, p. 157-162, 164; Aug. 23, 1951, p. 221-225.

Production of large cast iron parts for steam engine, using sand casting. (E11, CI)

455-E. Risering of Gray Iron Castings. B. F. Brown and H. F. Taylor. *Gray Iron Division, American Foundrymen's Society,* Progress Reports 1 and 2, 1950, 42 and 8 pages.

Report 1 consists of a correlated review of the literature plus a bibliography (with brief abstracts) of 143 references. Report 2 indicates projected laboratory work. It also includes a note on published electrical-analog studies, and seven additions to the bibliography. (E22, CI)

456-E. The Casting of Solder into Bars by the Castomatic Process. *Industrial Heating,* v. 18, Aug. 1951, p. 1386, 1388.

A machine for casting tin-lead solders and other white metal alloys in the form of small bars. (E16, Pb, Sn, SG-f)

457-E. Die-Casting Small Rotors. *Light Metals,* v. 14, Aug. 1951, p. 460-461.

Production of Al rotors for squirrel-cage motors using a cold-chamber die-casting machine. (E13, Al)

458-E. Die Castings. T. C. DuMond. *Materials & Methods,* v. 34, Aug. 1951, p. 83-98.

Manual includes sections on methods of production; materials; comparisons of die castings and other fabricated forms; design principles; finishing; and applications. (E13, T general)

459-E. Gases and Steel. Andrew McCance. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A25-A33; disc., p. A33-A34.

Previously abstracted from *Foundry Trade Journal.* See item 301-E, 1950. (E25, EG-m, CI)

460-E. Non-ferrous Investment Casting. Hiram Brown. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A87-A103.

Previously abstracted from *Institute of British Foundrymen.* (Paper No. 966). See item 343-E, 1950. (E15, Al)

461-E. Sand Casting of Conductivity Copper. W. H. Glaisher. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A110-A113; disc., p. 113.

Previously abstracted from *Institute of British Foundrymen* (Paper No. 968; also *Foundry Trade Journal.* See item 344-E, 1950. (E11, Cu)

462-E. Fluidity of Steel. J. E. Worthington. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A144-A151; disc., p. A158-A161.

Previously abstracted from *Institute of British Foundrymen* (Paper No. 971). See item 345-E, 1950. (E25, ST)

463-E. The Effect of Liquid Metal Properties on the Casting Fluidity of Alloys. V. Kondic. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A152-A157; disc., p. A158-A161.

Previously abstracted from *Foundry Trade Journal.* See item 318-E, 1950. (E25)

464-E. Review of the South African Foundry Industry. H. G. Goyns. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A174-A182; disc., p. A183-188.

Previously abstracted from *Institute of British Foundrymen,* (Paper No. 974). See item 346-E, 1950. (E general, A4, CI)

465-E. Rationalisation of Sand Preparation. J. F. Goffart. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A189-197; disc. p. A197-A201.

Previously abstracted from *Institute of British Foundrymen.* (Paper No. 975). See item 347-E, 1950. (E18)

466-E. Casting a Large Pulley in Aluminium Alloy. W. Wilson. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B1-B10; disc., p. B10-B13.

Previously abstracted from *Foundry Trade Journal.* See item 22-E, 1950. (E general, Al)

467-E. Some Modifications in Cupola Design. E. S. Renshaw and S. J. Sargood. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B14-B21; disc., p. B21-B24.

Mechanisms of lining wear, slag composition, thermal conditions, and economics. (E10)

468-E. Making Special-Duty Castings in Aluminium Alloys. J. Caven and H. W. Keeble. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B25-B34.

Production techniques. Character of the casting and foundry behavior of the alloy in which casting is made. (E11, Al)

469-E. Modernising an Iron Foundry. L. W. Bolton and W. D. Ford. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B35-B43; disc., p. B43-B45.

Previously abstracted from *Foundry Trade Journal.* See item 284-E, 1950. (E18, E24, CI)

470-E. Naturally-Bonded *versus* Synthetic Sands. John J. Sheehan and W. B. Parkes. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B46-B48.

A debate between above authors. (E18)

471-E. Refractories for the Foundry. A. Gunn. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B55-B61; disc., p. B61-B62.

Previously abstracted from *Foundry Trade Journal.* See item 78-E, 1950. (E10)

472-E. Symposium on Running Methods. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B63-B68; disc., p. B68-B70.

Consists of the following papers: "The Conner Runner," J. F. Measures; "The Distributed Runner," P. A. Russell; and "Running and Feeding of Non-Ferrous Casting," B. W. Berridge. (E23)

473-E. Pattern Equipment for Production Moulding. S. A. Horton. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B71-B79; disc., p. B79-B80.

Previously abstracted from *Foundry Trade Journal.* See item 61-E, 1950. (E17)

474-E. Patternmaking for General Engineering Castings. H. S. W. Brittain. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B81-B96; disc., p. B96-B98.

Previously abstracted from *Foundry Trade Journal.* See item 203-E, 1950. (E17)

475-E. Can the Manufacture of Malleable Cast Iron Be Improved? S. W. Palmer. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B99-B110; disc., p. B110-B111.

Previously abstracted from *Foundry Trade Journal.* See item 62-E, 1950. (E general, CI)

476-E. Cast Permanent Magnets. A. Braybrook and D. Hadfield. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B112-B118.

Previously abstracted from *Foundry Trade Journal.* See item 79-E, 1950. (E general, SG-n)

477-E. Gating Systems and the Production of Electrical and Machine Tool Castings. W. Collinge. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B119-B125; disc., p. B125-B127.

Previously abstracted from *Foundry Trade Journal.* See item 81-E, 1950. (E22, CI)

478-E. Moulding Technique Aids Production. S. R. Bridger. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B128-B133.

Previously abstracted from *Foundry Trade Journal.* See item 111-E, 1950. (E19, E21)

479-E. Work in a Jobbing Factory. J. F. Dowell and H. London. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. B134-B146.

Previously abstracted from *Foundry Trade Journal.* See item 168-E, 1950. (E11)

480-E. Designing Pattern Dies for Investment Casting. Part I. Rawson L. Wood and Davidlee Von Ludwig. *Tool Engineer,* v. 27, Aug. 1951, p. 25-28.

General considerations are discussed in this introductory article. (To be continued.) (E15)

481-E. Grain Refinement of Aluminum-Silicon (5% Si) and Aluminum-Silicon-Magnesium (7% Si, 0.3% Mg) Casting Alloys. Vincent DePierre and Harold Bernstein. *Transactions of American Society for Metals,* v. 43, 1951, p. 635-643.

Small rivet-shaped castings of Al-Si alloys, containing graduated amounts of refining elements, were made in a preheated graphite mold. The castings were sectioned, polished, and macro-etched, and their grain sizes measured. The added elements had similar effects upon grain size of the two alloys tested. B, Cb, Ti, Zr, Ta, Mo, W, Cr, and Be—in that order of effectiveness—refined the grain size of the two alloys. Boron produced its maximum effect at about 0.05% concentration by weight. (E25, Al)

482-E. Some Notes on Gas Holes in Iron Castings Cast in Green Sand Mould. (In English.) Toshihiro Kinoshita and Michio Ogata. *Japan Science Review,* v. 1, Dec. 1950, p. 75-80.

By using high-temperature molten metals and by keeping the pouring temperature above 1300° C., defects in castings can be minimized. Composition of the mold is discussed. (E25, CI)

483-E. Basic Cupola Melting. E. S. Renshaw. *Canadian Metals,* v. 14, Aug. 1951, p. 30, 32-34, 36, 38.

Favors desulfurization to low limits and also gives high carbon pick-up in low-carbon charges. These advantages are discussed with reference to nodular iron production. (E10, CI)

484-E. Metal Penetration. M. E. Nixon. *Canadian Metals,* v. 14, Aug. 1951, p. 42-44, 46-47.

Basic causes of metal penetration into sand molds used in the foundry. (E23)

485-E. Improving Cupola Operation With Oxygen-Enriched Blast. Roger O. Day. *Foundry,* v. 79, Sept. 1951, p. 84-87.

Schematic diagram shows set-up for supplying oxygen to the cupola. Results of extensive field tests conducted by Linde Air Products Co. (E10, CI)

486-E. Things We Know and Don't Know About Cast Steel. C. E. Sims. *Foundry,* v. 79, Sept. 1951, p. 92-97, 241-242, 244, 247-248, 250, 252-253.

Theories, practices, and the analytical approach to knowledge with respect to currently accepted facts regarding melting, refining, degassing acid and basic slags, and deoxidataion of steel. Several micrographs show appearance of sulfide inclusions under various conditions. Graphs show elimination of H_2 and N_2 by carbon boil; the Fe-Mn-S system: Si-O_2 equilibria; and comparative deoxidation with Al and Ti. (E25, D general, CI)

487-E. Studebaker Doubles Foundry Capacity. *Foundry,* v. 79, Sept. 1951, p. 98-105, 216, 218, 220, 222.

Methods and equipment used in preparing core sand and in making and handling cores. (To be continued.) (E18, E21)

488-E. Molding Sands for Nonferrous Alloys. *Foundry,* v. 79, Sept. 1951, p. 151-152.

Necessary characteristics of the sands. (E18, EG-a)

489-E. 500-Pound Casting Made in Permanent Mold. *Foundry,* v. 79, Sept. 1951, p. 152.

Ten-ton mold for the production of a large number of 500-lb. Al castings by the John Harsch Bronze Foundry Co., Cleveland. It is believed to be the largest of its kind in existence. (E12, Al)

490-E. How to Use the Cupola. Bernard P. Mucahy. *Foundry,* v. 79, Sept. 1951, p. 154, 156.

Ninth of a series. Various parts of the air system and their required characteristics. (To be continued.) (E10)

491-E. Small Electric Furnace Facilitates Experimental Work. *Foundry,* v. 79, Sept. 1951, p. 238.

Furnace used by U. S. Graphite Co., Saginaw, Mich., for experimental work in the foundry industry. (E10)

492-E. Observation and Control of Dust in Foundry Dressing Operations. Part I. Control of Dust. R. F. Ottignon. **Part II. Observation of Dust.** W. B. Lawrie. *Foundry Trade Journal,* v. 91, July 26, 1951, p. 99-104; Aug. 2, 1951, p. 129-137; Aug. 16, 1951, p. 181-185; disc., p. 186-188.

Previously abstracted from *Institute of British Foundrymen,* Paper 1008, 1951. See item 427-E, 1951. (E24)

493-E. Basic Cupola Melting and Its Possibilities. E. S. Renshaw. *Foundry Trade Journal,* v. 91, Aug. 23, 1951, p. 205-210.

Use of a basic-lined cupola as part of a production unit. Advantages of basic slag conditions which favor desulphurization to low limits and give high carbon pick-up in low-carbon charges, with particular reference to nodular iron production. (E10, CI)

494-E. Operation and Design of Hot-Blast Cupolas. F. C. Evans. *Foundry Trade Journal,* v. 91, Aug. 30, 1951, p. 247-251.

Operational and economic advantages of hot blast for different types of iron. Some of the engineering problems involved and how they have been solved. (E10, Fe)

495-E. Research and Development in Canadian Steel Foundry Practice. S. L. Gertsman. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 905-932; disc., p. 1047-1093.

Recent research carried out in Canadian steel-foundry practice and some of the developments which have taken place. Metal penetration, antipiping compounds, risers, austenitic Mn steel production, foundry mechanization and quality control. (E general, CI)

496-E. Impregnation Cuts Casting Rejects. M. Jordan Nathason. *Iron Age,* v. 168, Sept. 6, 1951, p. 115-117.

Impregnation is a method of sealing castings to eliminate porosity. Surveys the development of impregnants. They were applied to individual castings by vacuum or pressure. Recently developed techniques and use of "P.E. No. 1"—a thermosetting copolymer—as impregnating material. (E25)

497-E. Bibliography of the Die Casting Process: Parts II and III. Harold Bourassa. *Light Metal Age,* v. 9, Apr. 1951, p. 28-29; Aug. 1951, p. 31-32.

Continues list of references covering die casting of Al and die casting in general. (E13, Al)

498-E. Centrifugal Die-Casting of Tin Alloys Into Rubber Moulds. G. E. Gardam. *Metal Treatment and Drop Forging,* v. 18, Aug. 1951, p. 377-379.

An economy measure and some of its applications. (To be continued.) (E13, Sn)

499-E. Low-Frequency Induction Melting. Werner von Asten. *Modern Metals,* v. 7, Aug. 1951, p. 38-40.

To a very substantial extent, Germany has turned to the use of electric induction furnaces for the melting of Al or the production of rolling, extrusion, and forging ingots. Principal advantages. (E10, C21, Al)

500-E. Die Casting Magnesium; Improved Techniques and Growing Demand. *Modern Metals,* v. 7, Aug. 1951, p. 43-45.

The features of die casting, advantages of Mg, and some technical aspects. (E13, Mg)

501-E. Designing Pattern Dies for Investment Casting. Part II. Rawson L. Wood and Davidlee Von Ludwig. *Tool Engineer,* v. 27, Sept. 1951, p. 42-44.

Factors in pattern-die design. Desirability of a multiple-cavity die for a single cavity. Drafting requirements. (E15)

502-E. High Quality Cast Iron For Turbines. *Western Machinery and Steel World,* v. 42, Aug. 1951, p. 112.

The casting of an exhaust cylinder cover for an 11,500-kw. Westinghouse steam turbine, together with bearings for the same unit. (E11, CI)

503-E. "Pechiney-Cartoux" Triphase Indirect Arc Furnaces Used in Foundries. (In French.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 60, Mar.-Apr. 1951, p. 45-47.

Uses and operating data. (E10, ST)

504-E. Double-Chamber Induction Furnaces. (In Italian.) E. Calamari. *Alluminio,* v. 20, July 1951, p. 235-240.

Several types with emphasis on advantages of the Bora Z/D furnaces made by an Italian firm. Use for melting of Al is emphasized. (E10, Al)

505-E. Slags in the Melting of Cast Iron in Cupola Furnaces. (In Italian.) Gugliolmo Somigli. *Associazione Italiana di Metallurgia,* "Foundry Proceedings." Vol. II, 1948, p. 20-51.

Composition and formation of cupola slags. Effect of composition on viscosity of slags at various temperatures. 26 ref. (E10, CI)

506-E. Agglomeration Problems in the Foundry. (In Italian.) Mauro Arrighetti. *Associazione Italiana di Metallurgia,* "Foundry Proceedings." Vol. II, 1948, p. 52-69; disc., p. 69.

Proposes a uniform classification of foundry sand bonding materials. Determination of hygroscopicity and of quantity of gas evolved from such materials. (E18)

507-E. Electric Furnaces for Nonferrous Metals. (In Italian.) Elio Calamari. *Associazione Italiana di Metallurgia,* "Foundry Proceedings." Vol. II, 1948, p. 70-75.

Various types, particularly from the point of view of economical operations. (E10, EG-a)

508-E. A New Low-Frequency Induction Furnace for Ferrous and Nonferrous Foundries. (In Italian.) Aldo Tagliaferri. *Associazione Italiana di Metallurgia,* "Foundry Proceedings." Vol. II, 1948, p. 75-81. (E10)

509-E. Casting Defects in Aluminum and Magnesium Alloys. (In Italian.) Baldo Guastalla. *Associazione Italiana di Metallurgia,* "Foundry Proceedings." Vol. II, 1948, p. 91-98.

Various factors causing defects, and possibility of eliminating them. (E25, Al, Mg)

510-E. (Book) **The Foundry Industry in Illinois.** Harry Czyzewski and Burton C. Person. 148 pages. 1950. Bureau of Economic and Business Research, University of Illinois, Urbana, Ill. Free-of-charge.

The degree to which Illinois foundries have made use of developments in mechanization, captive vs. jobbing organizations, geographical and industrial distribution of markets, and technical control and development work. Product improvement is cited as a serious need of the foundry industry, and an analogy is drawn between the foundry and the automobile industry—likewise a mass-production enterprise. (E general, A4)

511-E. (Book) **Foundry Practice.** William H. Salmon and Eric N. Simons. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C. 2. 30s.

Covers the needs of the intermediate student in patternmaking and foundry practice based on the requirements of the city and Guilds of London Institute examinations. Emphasis is placed on pattern design and mold layout. (E17, E19)

512-E. (Book) **Adressbuch der Deutschen Giesserei Industrie, (Directory of the German Foundry Industry.)** 478 pages. Giesserei-Verlag, Duesseldorf, Germany. 15 D.M.

Divided into several sections. First is a regional index of foundries which are listed alphabetically with information on location, officials, whether it operates its own pattern and molding shop, size of castings produced, whether it is a jobbing or captive foundry or both, and type of castings produced. Other sections comprise indexes listing foundries alphabetically according to kind of foundry operated. Indexes in English, French, and Italian are included. (E general, A10)

513-E. Rigid Controls and Standards Improve Duplexing Operations. F. Coghlin, Jr. *American Foundryman,* v. 20, Sept. 1951, p. 24-27.

Standards for materials, equipment, operational procedures, and personnel training practiced in connection with successful malleable duplexing-melting operations. (E10, D7, CI)

514-E. Dropping the Cupola Bottom. *American Foundryman,* v. 20, Sept. 1951, p. 31. (Reprinted from article by James Timbrell, *Foundry Trade Journal,* v. 90, May 10, 1951.)

Recommends a cupola-bottom arrangement that makes dropping the bottom of a cupola an easy, safe operation. (E10, CI)

515-E. Controls for Green Working Strengths of Molding Sands. H. W. Dietert. *American Foundryman,* v. 20, Sept. 1951, p. 32-34.

Methods for complete control of green strength and green deformation of molding sands, by which either may be increased or decreased and controlled independently at selected levels. (E18)

516-E. Modern Foundry Methods: Unusual Equipment Employed to Make Centrifugally Cast Brake Drum. *American Foundryman,* v. 20, Sept. 1951, p. 36-39.

Equipment and procedures used to make steel brake drums for Centrifugal Fusing Co., Lansing, Mich. (E14, CI)

517-E. Mg-Zr Casting Alloys Attain High Strength-Weight Ratios. H. J. Millward. *American Foundryman,* v. 20, Sept. 1951, p. 44-47.

Sand and gravity die castings of Mg-Zr alloys have found many applications in airplane parts and turbojet engines. Extensive research developed a satisfactory method of introducing Zr into Mg, and the alloy has high strength-weight ratios and excellent mechanical properties. Melting, casting, and heat treating practices, and alloy properties. (E11, E13, Q general, Mg)

518-E. Some Experiments in Preparing Nodular Iron. W. P. Fishel and Robert C. Bramlette. *American Foundryman,* v. 20, Sept. 1951, p. 55-56.

Experiments reported shed some light on the temperature at which the nodules begin to form and the phase from which they originate. Results substantiate findings of previous researchers as to conditions needed for nodular-iron production. They are: a highly reducing metal as a reducing agent; an iron composition that will readily graphitize; and addition of about 0.5% Si as ferrosilicon after addition of one of the nucleating agents. (E25, CI)

519-E. Pulverized Fuel Furnaces for Melting Malleable Cast Iron. H. W. Perrott. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Aug. 1951, p. 1-15.

Development of the modern air furnace and the application of pulverized-fuel firing. The ball-mill grinding system with central storage is compared with the unit-pulverizing system. Method of grinding the fuel and distributing it to the furnace, and performance of different types of pulverized fuel-fired installations. Details of melting practice and fuel consumption. (E10, B18, CI)

520-E. The Sesci Furnace. P. C. Fassotte. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Aug. 1951, p. 17-20; disc., p. 26-31.

The object of the designer of the Sesci furnace was to reconcile two fundamental requirements in the production of malleable cast iron—high temperatures and uniform metal composition. Seven examples of melting practice in various sizes of Sesci furnace, ranging from 2 to 6 tons in capacity. Two of the examples refer to whiteheart malleable practice and the remainder to blackheart malleable. (E10, CI)

521-E. Oil-Fired Rotary Furnaces. W. D. Bullows. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Aug. 1951, p. 21-26; disc., p. 26-31.

Construction, operation, and fuel system of oil-fired rotary furnaces used in the author's plant, the fuel employed being creosote pitch. Positive air and oil control are employed to achieve metallurgical balance in the furnace, to obtain known melting times in order to balance mechanized production, and to increase the life of recuperator tubes. Results of three typical days' malleable-iron melting practice are tabulated. (E10, CI)

522-E. Measurement of Plastic Flow in Moulding Sands. A. Jamieson. *Foundry Trade Journal,* v. 91, Sept. 6, 1951, p. 271-277.

An investigation to establish a means of evaluating the working properties of molding sands and to define the properties of plasticity and flowability in scientific terms. (E18)

523-E. Dust in Foundry Operations. *Foundry Trade Journal,* v. 91, Sept. 13, 1951, p. 309-314.

Presents a discussion on papers previously abstracted: "Reduction of Dust in Steel Foundry Operations", W. A. Bloor; and "Observation and Control of Dust in Foundry Dress-

ing Operations", R. F. Ottignon and W. B. Lawrie. (See items 427-E and 492-E, 1951) New points on the interpretation of data in relation to iron foundries and other methods of dust estimation and advice on dust photography are given.
(E24, A7, CI)

524-E. Aluminum Casting Alloys. *Foundry Trade Journal,* v. 91, Sept. 13, 1951, p. 315-319.

A discussion on two papers previously abstracted: "Casting Characteristics of Some Aluminum Alloys", D. C. G. Lees. (See item 371-E and 396-E, 1951) and "DTD 424—The Versatile Light Alloy," A. P. Fenn (see item 501-Q, 1951).
(E25, Q general, Al)

525-E. Steel Foundry Progress; Reorganization by Osborn Foundry & Engineering Co. *Iron and Steel,* v. 24, July, 1951, p. 327-330; Aug. 1951, p. 382-386; Sept. 1951, p. 417-419, 422.

Principal changes in a British foundry for more efficient operations. Layout, equipment, and methods. (E general, CI)

526-E. The Grain Refinement of Aluminum Alloy Castings by Additions of Titanium and Boron. A. Cibula. *Journal of the Institute of Metals,* v. 19, Sept. 1951, p. 1-16.

By centrifuging the particles from molten alloys containing B but no Ti and observing the change in grain-size produced, evidence was obtained that nuclei in these alloys are AlB_2 crystals. The minimum B addition for adequate refinement of these alloys therefore depends mainly on solubility of AlB_2 in molten Al. Attempts to increase concentration of TiC in alloys containing Ti were unsuccessful. Addition of B instead of C was more effective in producing refinement. Grain refinement of some commercial casting alloys by simultaneous additions of Ti and B was studied in detail. Alternative methods of adding these elements and refinements produced by borides of transition metals other than Ti were investigated. 18 ref. (E25, Al)

527-E. Die Casting Continuous Assemblies. H. K. Barton. *Machinery* (London), v. 79, Aug. 30, 1951, p. 379-386.

Features of design that are necessary for the production of continuous assemblies. Various applications. (E13)

528-E. Furnaces for Light-Alloy Melting; Comparative Metallurgical Value of Two Different Types. Jean Trainier. *Metal Treatment and Drop Forging,* v. 18, Sept. 1951, p. 416-418.

A study of the low-frequency induction furnace and the gas-fired reverberatory furnace for light-alloy melting. Examines the relationship between loss in melting, oxide contamination, and gas porosity for each. (E10, Al, Mg)

529-E. Pre-Fabricated Construction: Locking Parts of New System Are Made by Die Casting. Alan T. Cazier. *Precision Metal Molding,* v. 9, Sept. 1951, p. 32-35, 77.

Die-cast Al parts used to lock extruded Al channels together to form frameworks for all types of building. (E13, T26, Al)

530-E. Special Machines Have Several Design Factors That Favor the Use of Investment Casting. *Precision Metal Molding,* v. 9, Sept. 1951, p. 36-37, 84.

Use of stainless steel and Stellite in jaw chucks. (E15, SS SG-j)

531-E. Over the Flame an Aluminum Permanent Mold Casting Takes 800 F. Without Blistering. Julius Klein. *Precision Metal Molding, v.* 9, Sept. 1951, p. 41, 91, 92.

By careful designing, the mechanical trimming of a permanent mold griddle casting can be reduced to a minimum series of operations that compare favorably with trimming costs of other casting methods.
(E12, Al)

532-E. Cams, Bearings, and Structural Parts by Die Casting and Powder Metallurgy. *Precision Metal Molding,* v. 9, Sept. 1951, p. 42-44, 87.

Production and applications of parts cast in Al, Cu-base alloys, and Zn-base alloys.
(E13, H general, Al, Cu, Zn)

533-E. Castings Made in Plaster Molds: the Process, Design Factors, Alloys, Tolerances and Advantages. K. A. Miericke. *Precision Metal Molding,* v. 9, Sept. 1951, p. 49-50, 56-58, 87-89.

The plaster is usually compounded with various types of fibrous and refractory aggregates such as fibrous talc and finely ground silica, pumice stone, clay or graphite. Design applications. (E16)

534-E. Light and Strong Construction Obtained with Die Casting, Investment Casting, Permanent Mold Casting and Powder Metallurgy. *Precision Metal Molding,* v. 9, Sept. 1951, p. 52-55.

Production of a portable power saw which utilizes the above methods for its various components.
(E12, E13, E15, H general, Cu, Be, Al)

535-E. 12,000 Psi Yield Strength Required of Permanent Mold Casting. Wayne Martin. *Precision Metal Molding,* v. 9, Sept. 1951, p. 59, 90.

Application of Al and Mg alloys for permanent mold castings. Mechanical properties are tabulated. (E12, Q general, Al, Mg)

536-E. Small Gear Housings: When Is It Practical to Produce a Transmission Case by Investment Casting. L. W. Millin. *Precision Metal Molding,* v. 9, Sept. 1951, p. 60, 87.

Application and examples. (E15)

537-E. Cupola Melting. R. W. Ruddle. *Australasian Engineer,* Aug. 7, 1951, p. 84-88.

Fundamentals which must be controlled if casting defects are to be kept at a minimum. Cupola design, quantity of air required, bed height, tapping the molten iron, and size of material. (E10, CI)

538-E. Ceramic Molds for Casting Metals, Thomas A. Dickinson. *Ceramic Age,* v. 58, Sept. 1951, p. 21, 23, 29, 41.

Ceramic molds offer high heat resistance combined with low thermal conductivity; relatively great chemical inertness at the temperatures required to melt a majority of commercial alloys; and qualities which permit fabrication of accurate molds at relatively low costs. (E19)

539-E. Melting Control Pays Off in Malleable Foundry. Edwin Bremer. *Foundry,* v. 79, Oct. 1951, p. 98-101, 264-266.

Installation of a cupola-electric furnace process to permit closer control of melting as well as of the resulting iron. (E10)

540-E. The Pattern Engineer and the Foundry. G. A. Pealer. *Foundry,* v. 79, Oct. 1951, p. 102-103, 258-259.

Need for closer cooperation between industrial foundries and patternmakers. Various examples of the choices available in pattern equipment and recommendations for selection and design. (E17)

541-E. Study of Metal Flow in Sand Molds. George Di Sylvestro. *Foundry,* v. 79, Oct. 1951, p. 104-109, 200-201.

Experiments show the efficiency of the procedure for study of metal flow. Cost of this type of research. (E25)

542-E. Casting Surfaces Produced in Olivine Molding Sand. Gilbert S. Schaller. *Foundry,* v. 79, Oct. 1951, p. 110-113, 260-263.

Tests were conducted to study the quality of casting surfaces. Methods employed are offered as a possible standard for casting-surface investigation. (E25)

543-E. Reinforced Plastic Core Driers Developed for Electronic Baking. Frances A. Vainosky. *Foundry,* v. 79, Oct. 1951, p. 144, 147.

Core dryers are made from American Cyanamid's Laminar Resin reinforced with fiberglas. Techniques employed. (E21)

544-E. Cast Aluminum Saucer Used in Radio Research. *Foundry,* v. 79, Oct. 1951, p. 167.

Production of a cast Al saucer 50 ft. in diam. The saucer was cast in pie-shaped sections and was assembled on one of the buildings at Naval Research Laboratory, Washington. (E11, T1, Al)

545-E. Manufacture of Propellers and Other Castings. C. W. Stewart. *Foundry Trade Journal,* v. 91, Sept. 13, 1951, p. 301-306; disc., p. 306-308.

Procedures at a 60-year-old British iron foundry. Although it uses outdated methods, it manages to turn out castings which compare favorably both in appearance and cost with those made in modern establishments. (E11, CI)

546-E. Centrifugal Castings for Aircraft Engines. *Metal Progress,* v. 60, Sept. 1951, p. 116, 118, 122. (Condensed from "Centrispun High-Alloy-Steel Aero-Engine Components," A. E. Thornton and J. I. Morley.)

Previously abstracted from "Symposium on High-Temperature Steels and Alloys for Gas Turbines," *Iron and Steel Institute,* Feb. 1951. See item 429-E. 1951.
(E14, Q general, AY)

547-E. Foundry Processing of Copper Alloys With High Electrical Conductivity. (In Portuguese.) Clovis Bradaschia. *Boletim da Associacao Brasileira de Metais,* v. 7, Apr. 1951, p. 87-97.

Production technique; results obtained with various alloys; and practical applications. 10 ref.
(E11, P15, Cu)

548-E. Interpretation of Permeability Experiments on Molds. (In Portuguese.) Carlos Dias Brosch. *Boletim da Associacao Brasileira de Metais,* v. 7, Apr. 1951, p. 98-118.

Method and setup for the experiments. It is suggested that permeability values should be lower than generally permitted in order to correlate them with other properties, such as the thermal conductivity of the mold. (E19)

549-E. Interpretation of Experiments on Mold Resistance. (In Portuguese.) Carlos D. Brosch. *Boletim da Associacao Brasileira de Metais,* v. 7, Apr. 1951, p. 193-206.

A resistance experiment is described for the characteristic stages of "green", "dry", and "heated". Resistance to cutting, compressive, and tensile stresses was investigated and an interpretation of "green" resistance values in relation to "deformation" of the mold was established. (E19)

550-E. KO Risers Are OK. L. C. Hollien. *American Foundryman,* v. 20, Oct. 1951, p. 30-32.

Necked-down or knock-off risers, K.O. for short, are applied to types of castings requiring maximum efficiency of the riser in order to secure soundness. Shows that their application on steel castings for oil field service greatly reduces chipping and burning time. The area requiring scarfing and grinding to casting contour was reduced by 93%. (E24, CI)

551-E. Soil Mechanics Aids Study of Mold Behavior Under Vibration. Dallas M. Marsh. *American Foundryman,* v. 20, Oct. 1951, p. 36-39.

When a matchplate is vibrated and withdrawn from the mold, it is believed to be influenced by such factors as passive earth pressure, ratio of induced frequency to natural frequency of the molding-sand mass, and directional nature of vibrations. Further experimental work is recommended. (E24)

552-E. Gray Iron Heat Conservation. Ralph A. Clark. *American Foundryman,* v. 20, Oct. 1951, p. 40-43.

Careful analysis of metal-handling methods and minor changes in existing equipment can result in substantial reductions in the 300-400° F. temperature losses experienced in many foundries. Such simple measures as covering the cupola spout and providing covers for receiving and transfer ladles have proved effective in reducing melting costs and delivering metal to the mold at the proper pouring temperature. (E10, CI)

553-E. Graphite Nodules; A Note on Spherulization of Graphite in Cast Iron. F. H. Buttner, H. F. Taylor, and John Wulff. *American Foundryman,* v. 20, Oct. 1951, p. 49-50.

A possible explanation of nodular graphite formation in cast iron is offered by evaluation of interfacial energy between the liquid melt and the growing graphite particle. Equations are based on spherulitic growth and nucleation theories developed by other investigators, and the authors' work on surface energy. 12 ref. (E25, P10, CI)

554-E. Foundry Sand Control—No. 1 Enemy of Scrap. George W. Anselman. *American Foundryman,* v. 20, Oct. 1951, p. 52-57.

Poor foundry sand practice is said to be responsible for 22 of the possible 31 defects that can occur in the casting of gray iron. Of these, 11 defects are directly attributable to sand, which also may be a contributing factor in a dozen other defects. (E18)

555-E. How to Use the Cupola. Bernard P. Mulcahy. (Continued). *Foundry,* v. 79, Oct. 1951, p. 204, 207-208, 211.

Balanced blast and hot blast cupolas with an explanation of dehumidification of the blast. (To be continued.) (E10)

556-E. Studebaker Doubles Foundry Capacity. (Continued) Ray H. Moore. *Foundry,* v. 79, Oct. 1951, p. 114-119.

Molding and pouring cylinder blocks and smaller castings. Extensive facilities employed to control dust, smoke and fumes. (To be continued). (E11)

557-E. Operation and Design of Hot-Blast Cupolas. F. C. Evans. *Foundry Trade Journal,* v. 91, Sept. 6, 1951, p. 279-282.

The problems encountered. Diagrams on recuperator design to overcome the dust problem in the field. (To be continued). (E10, CI)

558-E. Synthetic Resins in the Foundry. *Foundry Trade Journal,* v. 91, Sept. 20, 1951, p. 345-350.

Discussion of I. B. F. sub-committee report. (July 5 issue, see item 401-E, 1951.) (E18)

559-E. Furnace Efficiency. *Iron and Steel,* v. 24, Oct. 1951, p. 487-490.

Uniformity of hearth temperature and full utilization of the heat input are two of the more important problems of iron and steel auxiliary furnacing. Improved designs for mold-drying ovens and heat treating furnaces in the foundry. (E19, J general)

560-E. Casting Design. C. T. Marek. *Machine Design,* v. 23, Oct. 1951, p. 190, 192, 194, 197. (A condensation).

General principles. (E general)

561-E. Permanent-Mold Casting of Steel in Aluminum Dies. *Machinery* (American), v. 58, Oct. 1951, p. 152-158.

Features of the process and current activities of the English company which patented the process. (E12, ST, Al)

562-E. Metal Melting and Handling in the Die Casting Shop. H. K. Barton and L. C. Barton. *Machinery* (London), v. 79, Sept. 27, 1951, p. 540-546.

The main requirements for an efficient metal-handling system. (E13)

563-E. The Research and Development Division of the British Steel Founders' Association. J. F. B. Jackson. *Metallurgia,* v. 44, Sept. 1951, p. 137-139.

A brief outline of the organization and three of the many fields of research in which it is already engaged —freezing mechanism of steel, mold refractories, and steel foundry dust. (E general, A9, CI)

564-E. High-Vacuum Melting. *Metallurgia,* v. 44, Sept. 1951, p. 163-164.

A newly developed Swiss plant consists of a simple tilting furnace with its accompanying mold, operating within a vacuum chamber. Ideal for melting special steels, copper, alloys with readily oxidizing constituents such as Ti, Zr, Mn, Cr and their alloys. (E10)

565-E. Improved Aluminum Bearings (Al-Sn and Al-Sn-Cu Alloys). H. K. Hardy, E. A. G. Liddiard, J. Y. Higgs, and J. W. Cuthbertson. *Metal Progress,* v. 60, Oct. 1951, p. 97-103, 224.

Experiments made on laboratory melts cast into standard round test bars, 6 in. long. Molds were either baked sand, Al bronze, or "water chill cast" (by pouring into a 1¼-in. cylindrical thin sheet-steel container and allowing water to rise in an outer container at such a rate that directional solidification occurred from the bottom of the ingot). These various molds were used to study the influence of rate of solidification on microstructure.
(E25, M27, Al, SG-c)

566-E. Centrifugal Steel Casting in Permanent Molds. Part I. John Osborn Felt. *Tool Engineer,* v. 27, Oct. 1951, p. 41-43.

Procedures. Mechanical properties of various specimens are tabulated. (E14, Q general, CI)

567-E. Producing Leak-Proof Aluminum Castings. E. M. Hunt. *Foundry,* v. 79, Nov. 1951, p. 96-97, 218-219.

Recommended procedures for minimizing porosity. (E25, Al)

568-E. Developing a Pilot Foundry. Carl B. Stone. *Foundry,* v. 79, Nov. 1951, p. 98-100. [Reprinted from *Iron Worker* (Lynchburg Foundry Co.)]

Experimental foundry of Lynchburg Foundry Co., Lynchburg, Va. (E general, A9)

569-E. Studebaker Doubles Foundry Capacity. (Concluded.) Ray H. Moore. *Foundry,* v. 79, Nov. 1951, p. 102-107, 214-216.

Details of handling equipment and procedures following shakeout. (E24)

570-E. Precision Casting of Heat-Resistant Alloys at Allis-Chalmers. *Industrial Heating,* v. 18, Oct. 1951, p. 1810-1812, 1814, 1816, 1818, 1820, 1822, 1915-1916.

Equipment and procedures for the "lost wax" process. (E15, SG-h)

571-E. The Nucleation of Cast Metals at the Mould Face. J. A. Reynolds and C. R. Tottle. *Journal of the Institute of Metals,* v. 80, Oct. 1951, p. 93-98.

Nucleation effected by applying metal powders to the face of a standard mold was investigated by comparing grain-size of ingot surfaces produced with and without the coating. In general, powdered metals having the same crystallographic form as the metal being cast are effective as nucleating agents, provided that the degree of lattice "misfit" does not exceed 5%, or in some cases 10%. This simple mechanism was found to apply to the solidification of Sn, Pb, Zn, Sb, Al, Mg, and Cu. 16 ref.
(E25, N2, Sn, Pb, Zn, Sb, Al, Mg, Cu)

572-E. Cellini Showed Us How to Precision-Cast High Alloys. G. A. Hanke, Jr. *Steel Horizons,* v. 13, Fall 1951, p. 12-13.

Present-day equipment and procedures of lost-wax process. The same principles were used by sculptor and metal worker Bevenuto Cellini in the 16th century. (E15)

573-E. Proposal for a Standard Classification of Casting Defects. (In Czech.) Adolf M. Plesinger. *Hutnické Listy,* v. 6, June 1951, p. 262-270.

Details of system, use of which should result in improved foundry practice. Includes extensive tables. 15 ref. (E25)

574-E. Improvement of Synthetic Argillaceous Sands. (In French.) Pierre Nicolas. *Fonderie,* June 1951, p. 2503-2512.

Influence of the shape of the sand grains, the suitability of various colloidal clays found in France, thermal reactions of synthetic sands, modification of properties brought about by adding carbon black and results obtained when using a humidity regulator. (E18)

575-E. The Manufacture of Multiple Grooved Pulleys. (In French.) Francois Simorre. *Fonderie,* June 1951, p. 2513-2520.

Discusses an article by N. A. Birch in *American Foundryman,* Jan. 1950 (see item 34-E, 1950). Production of various pieces and schematic drawings. (E22, CI)

576-E. Guide for Choice, Construction, and Operation of Core-Drying Ovens. (In French.) *Fonderie,* June 1951, p. 2521-2535.

Elements of construction of ovens, and operation of various types. Numerous schematic diagrams. (E21)

577-E. Graphite and Its Applications in Foundry Practice. (In French.) Charles Dennery and Francois Pensa. *Fonderie,* July 1951, p. 2547-2564.

Characterization of graphite, modes of formation, production of graphite products; physical and chemical properties of synthetic graphite; utilization of its refractory properties; carburization of steels and cast iron; and other applications. (E general, C-a, CI)

578-E. Growth of Cast Iron; Application to Study of Ingot Molds. (In French.) Paul Rocquet and Michel Olette. *Fonderie,* July 1951, p. 2565-2577.

Describes experiments. Factors hitherto neglected, such as graphitization, deformation due to volume variation when passing the transformation point, and oxidation are considered. 10 ref. (E25, D9, CI)

579-E. Defects in Steel Castings. (In Italian.) Giacomo Ferrero and Giuseppe Ziliani. *Metallurgia Italiana,* v. 43, Aug. 1951, p. 323-332.

Divides defects into two types—those due to metallurgical factors and those due to poor foundry practice. Causes of the various types and their avoidance. 35 ref. (E25, CI)

580-E. The Process of Die-Casting. J. A. de Kiewiet. *Foundry Trade Journal,* v. 91, Oct. 11, 1951, p. 413-418, 422.

Principal materials, techniques and practices, and construction of dies. Composition of some nonferrous alloys used. (E13, EG-a)

581-E. Casting Soundness Can Be Controlled. *Steel,* v. 129, Nov. 12, 1951, p. 81-82.

Design and materials engineers, working closely with foundry technicians, can reduce shrinks and general porosity in castings, saving time, labor, and materials and eliminating the hazards of using defective castings. (E25, CI)

582-E. Centrifugal Steel Casting in Permanent Molds. Part II. John Osborn Felt. *Tool Engineer,* v. 27, Nov. 1951, p. 47-48, 54.

How flanged rings or bushings can be cast by the above method. Applications in the production of jet-engine components. (E14, CI)

583-E. Production of Chill Molds. (In German.) E. Feil. *Giesserei,* v. 38 (new ser., v. 4), July 26, 1951, p. 345-355.

Reasons for the limited life of chill molds were investigated. Structure, hardness, and segregation of sulfides greatly affect their durability. Other important factors are Si, P, and Mn content, and casting temperature. (E12, CI)

584-E. Molding Sands and Patterns in the High-Grade Steel Foundry. (In German.) W. Sauermann. *Giesserei,* v. 38 (new ser., v. 4), July 26, 1951, p. 360-362.

Tables, photographs, and diagrams supplement a general discussion. (E18, E17, CI)

585-E. Centrifugal Casting. (In German.) E. Englisch. *Giesserei,* v. 38, (new ser., v. 4), Aug. 9, 1951, p. 369-373.

Optimum conditions for centrifugal casting of different kinds of ferrous and nonferrous metals. (E14)

586-E. Cast Structural Parts. (In German.) H. Stein, W. Rave, and H. Picard. *Giesserei,* v. 38, (new ser., v. 4), Aug. 9, 1951, p. 373-374; disc., p. 374-375.

Design of pouring and gating systems. (E22, E23, CI)

587-E. Development and Experiences With Hot-Blast Cupola Furnaces. (In German.) K. Roesch. *Giesserei,* v. 38, (new ser., v. 4), Aug. 23, 1951, p. 393-397.

Properties, designs, and operation of different blast heaters. Output, optimum blast temperature, metallurgical effect, and economy of hot-blast cupolas. (E10, CI)

588-E. Refining, Degassing, Desulfurizing, and Pipe-Prevention Agents for Nonferrous Metals, Cast Iron, and Cast Steel. (In German.) E. Piwowarsky. *Giesserei,* v. 38 (new ser., v. 4), Sept. 6, 1951, p. 417-422.

Discussion of published practices and experimental results. Refining high-Mg alloys with gray-iron chips and the application of exothermic mixtures in which part of the iron oxides are replaced by copper oxides. Data are tabulated. (E25)

589-E. Advances in Foundry Practice in the Second Half of 1950. (In German.) Paul A. Heller. *Stahl und Eisen,* v. 71, Sept. 13, 1951, p. 1011-1014; Sept. 27, 1951, p. 1058-1063.

Review of literature. 81 ref. (E general)

590-E. Gates and Heads for Steel Castings. John Howe Hall. *Foundry,* v. 79, Nov. 1951, p. 108-109, 236, 238, 240, 242, 244, 246, 248.

The fundamentals involved in designing gating systems and feeding heads employed in the production of steel castings. (First of a series. To be continued.) (E22, CI)

591-E. How to Use the Cupola. Bernard P. Mulcahy. *Foundry,* v. 79, Nov. 1951, p. 250, 252-253.

Fluxing the cupola melt, and the importance of a reliable temperature log of the heat. (11th article of series. To be continued.) (E10, CI)

592-E. Die Casting Die Design. Part V. H. K. Barton and James L. Erickson. *Magazine of Tooling and Production,* v. 17, Nov. 1951, p. 52-53, 76, 84.

"Overflows" — separated cavities cut into the face of die-casting dies adjacent to the main cavity and connected to it by means of a channel which permits molten alloy to flow into it directly from the main die cavity as the latter fills. (To be continued.) (E13)

593-E. Investment Casting. G. A. Tomkinson. *Metal Industry,* v. 79, Oct.

12, 1951, p. 315-318; Oct. 19, 1951, p. 335-338.

The process and its applications. (E15)

594-E. Saving up to 84 Per Cent on Gears, Pawls and Special Shapes by Investment Casting and Powder Metallurgy. *Precision Metal Molding,* v. 9, Nov. 1951, p. 36-38, 60.

Parts used in addressograph and multigraph equipment. Table shows old and new methods and cost savings for specific parts. Materials are Cu and Fe powders and SAE 1117 steel.

(E15, H general, T10, Cu, Fe, AY)

595-E. Flexure Under Load Is Overcome With a Rigid Frame by Permanent Mold Casting. Bruce Adams. *Precision Metal Molding,* v. 9, Nov. 1951, p. 32-33, 62-64.

Used in connection with design of small scales. Material is Al alloy. (E12, T8, Al)

596-E. Provision for Resisting Operating Stresses in Die Casting Dies. H. K. Barton. *Machinery* (London), v. 79, Oct. 25, 1951, p. 729-736.

Details of design principles. (E13, T5)

597-E. Critical Observations on Standard Methods for Testing of Molding Sands. (In German.) W. Gotz. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, Aug. 1951, p. 225-248; disc., p. 249-251.

The property requirements and most important testing methods for molding sands. 24 ref. (E18)

598-E. Cupola Refractories. (In Swedish.) Erik O. Lissell. *Gjuteriet,* v. 41, Mar. 1951, p. 35-43.

The attack of fuel, metal, and slag on the various parts of the furnace. Choice of refractory materials. Special attention is given to the combustion zone where the burn-out is most severe. Factors governing the degree and shape of burnout and suggestions for minimizing erosion. Composition and properties of patching materials. 17 ref. (E10)

599-E. Preheating of the Cupola Blast. (In Swedish.) W. von Preen. *Gjuteriet,* v. 41, Aug. 1951, p. 117-121.

The theory of hot-blast cupolas on the basis of Piwowarsky's statements. The blast may be preheated in a separately fired air heater or with the aid of waste gases from the cupola. Heat-flow diagrams show how the hot blast changes thermal conditions in the cupola. Advantages and disadvantages. 10 ref. (E10, CI)

SECTION F

PRIMARY MECHANICAL WORKING

1-F. Hot Working of Tin Bronzes. Daniel R. Hull. *Metal Progress,* v. 58, Dec. 1950, p. 890, 892, 894. Condensed from paper D. W. Dugard Showell.

Previously abstracted from *Journal of the Institute of Metals.* See item 61-F, 1950. (F general, Q23, Cu)

2-F. Extrusion Effects. *Metal Progress,* v. 58, Dec. 1950, p. 912, 914. Translated and condensed from "Extrusion Effects in Al-Zn-Mg Alloys With 4.5% Zn and 3.5% Mg", G. Siebel.

Previously abstracted from *Metallforschung.* See item 19d-69, 1948. (F24, Q general, Al)

3-F. Operation of New 16-In. Electric-Weld Pipe Mill. C. W. Morehead. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 111-115.

Mill of Page-Hersey Tubes, Ltd., Welland, Ontario, Canada. (F26, ST)

4-F. A New Continuous Rolling Mill for Aluminium. *Metal Treatment and Drop Forging,* v. 17, Autumn 1950, p. 141-147.

See also items 267-F and 268-F, and 287 through 292-F, 1950. (F23, Al)

5-F. A Swedish Technician's Comments on the American Drop Forging Industry. B. Lagercrantz. *Metal Treatment and Drop Forging,* v. 17, Autumn 1950, p. 164-166.

Compares American, British, and Swedish productivity, techniques, and equipment. (F22, ST)

6-F. Speeding Up of Forging. (In Czech.) Frantisek Drastik. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 80-84.

Equipment for reducing time requirements by use of a multiple forging hammer. Use of four hammers striking in rotation reduces time required to 25% of that with one hammer. The process is especially advantageous for high-alloy steels requiring a limited degree of deformation. (F22, ST)

7-F. Mass Production of 2½ Miles of Pipe Daily. D. A. Evans. *Iron Age,* v. 166, Dec. 28, 1950, p. 68-73.

Steel pipe mill of National Tube Co., Pittsburgh. Forming, welding, and cold expanding are involved. (F26, ST)

8-F. Rolls and Rolling; Part XXI. Channels. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 38, Dec. 1950, p. 1435-1446.

Roll-pass diagrams and descriptive material. (F23)

9-F. Wheeling's Fretz-Moon Pipe Mill at Benwood. *Steel Equipment & Maintenance News,* v. 3, Dec. 1950, p. 4-5. (F26)

10-F. Nonferrous Strip Capacity Expanded. W. Bomboy. *Steel,* v. 128, Jan. 8, 1951, p. 72, 74, 76.

By installing two new 4-high mills, an automatic coil-welder, continuous pickling systems, improved inspection techniques, better materials handling equipment, and by rearranging its entire shop, Riverside Metal Co., Riverside, N. J., is gradually pushing up production of rolled Cu and Ni alloys. (F23, Cu, Ni)

11-F. Rolling Mills; Design and Provision of Finishing Equipment. J. R. Cuthbert and M. S. Doshi. *Iron and Steel,* Nov. 28, 1950, p. 416-420.

Hot saws and hot shears; cooling banks; roller straightening machines; gag presses; and loading arrangements. (F29)

12-F. New 42-in. Slabbing Mill; Further Progress at Hawarden Bridge. *Iron and Steel,* Nov. 28, 1950, p. 423-428.

A British steel works. (F23, ST)

13-F. Study on the Back Tension Drawing Method. (In English.) Kenichi Nakamura and Hiroshi Kaga. *Journal of Mechanical Laboratory,* v. 4, Mar. 1950 (Special No.), p. 22-25.

Results of experimental investiga-

tion for high and low-carbon steel wire. (F28, CN)

14-F. Study of the Back-Pull Drawing Method Part II. The N. N. S. Type Back-Pull Drawing Machine. (In Japanese.) Kenichi Nakamura and Osamu Nishimura. *Journal of Mechanical Laboratory,* v. 4, May 1950, p. 118-125.

Mathematical analysis of the above. Includes geometrical diagrams. (F28)

15-F. Swaged Generator Pole Shoes Conserve Copper Wire. Herbert Chase. *Automotive Industries,* v. 104, Jan. 1, 1951, p. 40-41, 70, 72, 74.

Equipment and procedures for production of pole shoes for use in automotive generators. Hot rolled SAE 1008 steel strip is used as the raw material. (F25, T1, Cn)

16-F. Huge Hydraulic Presses Needed for Making Large Aircraft Part. K. B. Wolfe. *Automotive Industries,* v. 104, Jan. 1, 1951, p. 50-51, 78, 80.

Large German presses which have been brought to the U. S., also Air Force sponsored plant in Adrian, Mich., in which heavy extrusion and forging presses are operated both for manufacturing and research work. Work is not limited to light metals. (F22, F24, Al)

17-F. Motors That Propel the 3.5-Inch Rockets. Charles O. Herb. *Machinery* (American), v. 57, Jan. 1951, p. 164-174.

Forging, machining, and heat treating operations in production of rocket motors. SAE 4140 steel is used. (F22, G17, J general, T25, AY)

18-F. Aluminum Die Forgings Design; Standard Dimensional Tolerances. A. E. Favre and A. J. Orazem. *Product Engineering,* v. 22, Jan. 1951, p. 125-129.

Recommendations. Standard tolerances are tabulated and their use clarified by diagrams. (F22, Al)

19-F. New Giant Presses Will Speed Plane Production. Bill Olson. *Iron Age,* v. 167, Jan. 18, 1951, p. 75-76.

Huge forging and extrusion presses ordered by U. S. Air Force as part of $200 million program; also time, labor, and material savings which will be made possible by their use. (F22, F24)

20-F. Measurement of Temperature During Bar and Wire-Drawing Operations and the Problem of Supercritical Drawing Speeds. (In German.) Walter Reichel. *Stahl und Eisen,* v. 70, Dec. 7, 1950, p. 1141-1145; disc., p. 1145-1146.

Various methods for measuring temperatures developed in drawing dies for steel bars and wire. This temperature can be used as an aid in selection of processes, die designs, drawing rates, lubricants, and coolants. 27 ref. (F27, F28, S16, ST)

21-F. Reduction of Internal Stresses Resulting From the Cold-Drawing of Bars. (In German.) Hans Bühler and Ernst Hermann Schulz. *Stahl und Eisen,* v. 70, Dec. 7, 1950, p. 1147-1151; disc., p. 1151-1152.

Proposed method involves slight redrawing of highly drawn steel bars which reduces their internal stresses 70-90% without impairing their surface conditions and properties. Claims that the method is technically and economically superior to other methods of stress relief. Data for four carbon steels are charted and tabulated. 15 ref. (F27, CN)

22-F. Hot Working of Copper and Alloys. *Metal Progress,* v. 59, Jan. 1951, p. 116, 118, 120. (Condensed from paper by Maurice Cook and Edwin Davis).

Previously abstracted from *Journal of the Institute of Metals.* See item 60-F, 1950. (F general, Q23, Cu)

23-F. Kaiser's Newest Electric Weld Pipe Mill. Frank P. Cavenagh. *Western Machinery and Steel World,* v. 42, Jan. 1951, p. 76-79.

(F26, CN)

24-F. New Methods for Manufacturing Boiler Fittings by Forging, Welding and Machining. K. Krekeler. *Engineers' Digest,* v. 11, Dec. 1950, p. 427-430. (Translated and condensed).

Previously abstracted from *Zeitschrift des Vereines Deutscher Ingenieure.* See item 295-F, 1950. (F22, G17, K1, T7, ST)

25-F. Hot-Breaking-Down Rolls for the Production of Aluminium Sheet. *Sheet Metal Industries,* v. 28, Jan. 1951, p. 12-15.

Equipment and details of recommended procedures. Causes of mosaic cracking of the sheet, roll-forging technique, heat treatment and finishing of rolls, and roll performance. (F23, Al, ST)

26-F. Nomograms for the Evaluation of Hitchcock's Formula for Roll Flattening. D. A. Winton. *Sheet Metal Industries,* v. 28, Jan. 1951, p. 16-17.

Presents the formula and nomograms. Construction and use of the latter. (F29)

27-F. Some Factors in the Design of Aluminium Assemblies With Particular Reference to Forming, Joining and Finishing. J. C. Bailey. *Sheet Metal Industries,* v. 28, Jan. 1951, p. 25-34.

Characteristics of the various processes and the properties of the

alloys themselves, in so far as these affect design, both individually and in combination.
(F22, G general, K general, L general, Al)

28-F. Continuous Strip Mill; An Important Development by Northern Aluminium Company Limited. *Automobile Engineer,* v. 40, Dec. 1950, p. 445-451.
Previously abstracted under similar titles. See item 267-F, 268-F and 287 through 292-F, 1950; and 4-F, 1951. (F23, Al)

29-F. 42-In. Slabbing Mill at Shotton. *Engineering,* v. 171, Jan. 5, 1951, p. 1-5.
British mill for producing steel slabs from ingots. (F23, ST)

30-F. Report of Rolling Experiences. Louis Moses. *Iron and Steel Engineer,* v. 28, Jan. 1951, p. 59-65, disc., p. 65-67.
How the roll designer applies his art on a scientific basis to solve operating problems. (F23)

31-F. Operating the World's Fastest Mill. Operations. J. R. Powell. **Control.** George A. Kaufman. *Iron and Steel Engineer,* v. 28, Jan. 1951, p. 73-80; disc., p. 80-82.
A number of novel and unusual design features first installed on rolling mill of Jones & Laughlin Steel Corp., Aliquippa, Pa., which is rated the fastest mill in the world. (F23, ST)

32-F. 19-Stand Rod Mill of Keystone Steel and Wire Co. William Herman. *Iron and Steel Engineer,* v. 28, Jan. 1951, p. 91-95.
By 2-stranding the roughing mill and 4-stranding the remainder, production of the above mill has been increased 150%. Includes layout diagram and mill data sheet. (F27, ST)

33-F. Electric Motors Over Three Hundred Horsepower Applied to Main Roll Drives in the Iron and Steel and Allied Industries During 1950. *Iron and Steel Engineer,* v. 28, Jan. 1951, p. 137-140.
A table. (F23)

34-F. Integrally-Stiffened Skin Revolutionizes Aircraft Construction; I. Forged Sections. II. Rolled and Cast Sections. III. Machined Sections. P. E. Sandorff and George W. Papen. *Iron Age,* v. 167, Feb. 1, 1951, p. 99-102; Feb. 8, 1951, p. 87-90; Feb. 15, 1951, p. 91-94.
Sheet material with integral stiffening ribs and other structural details is under investigation by the aircraft industry, intent on lowering production costs. Among the methods of producing such structures, forging offers many advantages. Huge presses and new forging techniques to produce integrally stiffened aircraft wing and fuselage structural panels. Part II: How the sheet is made by rolling-in stiffening ridges during processing of sheet stock. Many aircraft and other uses. Part III. Production by machining is attractive despite high chip loss. Use in experimental structures and models. (F22, F23, G17, T24)

35-F. Rolls and Rolling. Part XXII. Angles. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 39, Jan. 1951, p. 93-102, 104.
Roll passes for various types of angles. (F23)

36-F. Rolling and Mechanical Properties of Magnesium Alloy Sheet Containing 0-9.5% Aluminium. A. E. L. Tate. *Journal of the Institute of Metals,* v. 78, Sept. 1950, p. 71-92.
Rolling of cast Mg-alloy ingots into sheet and some mechanical properties of the sheet. The alloys contained 0-9.5% Al with 0.3% Mn. Comparative tensile properties of sheet produced by hot rolling alone and of sheet finisned by cold rolling. (F23, Q general, Mg)

37-F. The New 42-In. Slabbing Mill at Shotton; Further Progress at the Hawarden Bridge Steel Works. *Metallurgia,* v. 42, Dec. 1950, p. 397-399.
(F23, ST)

38-F. Wire-Drawing Research; Recent German Work on Alloy Steels. J. G. Wistreich. *Metal Treatment and Drop Forging,* v. 18, Jan. 1951, p. 22, 24.
(F28, AY)

39-F. Discussion on the Paper: "The Compression Test in Relation to Cold Rolling," by N. H. Polakowski. *Journal of the Iron and Steel Institute,* v. 166, Dec. 1950, p. 305-314.
Covers paper published in Nov. 1949 issue (see item 19A-275, 1948). Includes author's replies. 14 ref.
(F23, Q28)

40-F. The Hot Working of Stainless Steels. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 22, Dec. 23, 1950, p. 79, 81-82.
Recommended procedures.
(F general, SS)

41-F. Recently Determined Relationships for Calculating the Lateral Expansion Caused by Rolling. (In German.) Ernst Cotel. *Stahl und Eisen,* v. 70, Dec. 21, 1950, p. 1219-1222.
Four approximation formulas for calculating lateral expansion. Comparison of calculated with experimental results shows the proposed formulas to be quite accurate. (F23)

42-F. Cold-Rolling of Steel. (In German.) Hans Bechmann. *Stahl und Eisen,* v. 70, Dec. 21, 1950, p. 1222-1223.
The ratio of expansion to thickness reduction depends on original thickness and width, radius of the

rolls, and rolling rate. An approximation formula for calculating the above. Results for steel of several common values for width vs. roll-radius shown graphically. (F23, ST)

43-F. The Outlook for the Forging Industry. *Steel Processing,* v. 37, Jan. 1951, p. 17-19.

Economic analysis and forecast. (F22, A4, ST)

44-F. Increasing Drop Forging Die Life. Part II. John Mueller. *Steel Processing,* v. 37, Jan. 1951, p. 25-27.

Design recommendations. (F22)

45-F. Forge-Tapered Wing Spars Cut Airplane Weight 50 Pounds. *Steel,* v. 128, Feb. 19, 1951, p. 74.

Novelty of the new method lies in providing a bulb of aluminum in the web of what otherwise is an I-beam type extrusion. The extrusion is then forged in such a manner that the bulb is progressively flattened. After forging, the web tapers from 10 in. at one end to approximately 15½ in. at the other. (F22, T24, Al)

46-F. Cold Rolling Technique; The Application of Theory and Experiment to the Practice of Rolling. Methods of Calculating Roll Force and Torque Based on Theories of Rolling. (Series continued). Hugh Ford. *Sheet Metal Industries,* v. 28, Jan. 1951, p. 5-11, 18.

Assumptions made in early theories of rolling and interpretation of these theories. Orowan's general theory and its application to specific cases. Includes completely worked-out example. (To be continued.) (F23)

47-F. Works Practice on the Continent. *Sheet Metal Industries,* v. 28, Jan. 1951, p. 51-55; Feb. 1951, p. 158-160, 166.

Detailed report of the first continental tour organized by the Sheet and Strip Metal Users' Technical Association. Covers The Philips' Works, steels and deep drawing, steel research, deep drawing of light alloys, impact extrusion, product finishing, press shops, hydraulic presses, working conditions, and other interesting research. (F general, G general)

48-F. Flakes in Pieces of Steel. (In French.) Albert Portevin and Etienne Pretet. *Revue de Métallurgie,* v. 47, Dec. 1950, p. 889-893; disc., p. 893-894; *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Nov. 27, 1950, p. 1188-1190; disc., p. 1191. (From document removed from sealed packet dated June 3, 1935.)

Factors responsible for flakes, including influence of structure, corrosion, and rate of cooling before forging. In the discussion, Pierre Chevenard points out the value of the ideas presented, although the role of hydrogen had not yet been recognized in 1935. (F22, M27, ST)

49-F. Contribution to the Study of Deformation of Special Steels During Rolling. (In French.) M. Cabane. *Revue de Métallurgie,* v. 47, Dec. 1950, p. 930-935; disc., p. 936.

Tabulated and charted data indicate that temperature of rolling is a more important factor than quality of the steel. Other factors involved. (F23, ST)

50-F. Rolling Mills; Current American Research, Design and Installations. A. I. Nussbaum. *Iron and Steel,* v. 23, Dec. 1950, p. 481-486; v. 24, Jan. 1951, p. 11-15; Feb. 1951, p. 55-58.

1948 Mond Nickel Fellow presents a general survey of findings of a year's stay in the U. S. (F23)

51-F. The Production of Bolts and Nuts. A. P. Newell. *Engineering,* v. 171, Feb. 2, 1951, p. 142-143. (A condensation).

Principal methods: machining, cold upsetting, and hot forging, and their relative merits. (F22, G17, T7, ST)

52-F. Integrally-Stiffened Skin Revolutionizes Aircraft Construction: Extruded Sections and Forming Methods. P. E. Sandorff and George W. Papen. *Iron Age,* v. 167, Feb. 22, 1951, p. 74-77.

Fourth of series. How skin with integral T-shaped stiffness can be extruded. It will find wide application where loads are high and there are few irregularities in contour. Physical properties are high. Forming of integrally stiffened parts produced by any of the methods can be done on standard sheet-metal equipment, using only slightly different techniques. (F24, G1, Al, Mg)

53-F. Modern Blooming Mill Practices. D. W. Lloyd. *Iron and Steel Engineer,* v. 28, Feb. 1951, p. 59-64; disc., p. 64-65.

Effects of openhearth deoxidation practice and pouring-pit practice in connection with the formation of surface and subsurface defects. Poor practices in soaking pits and reheat furnaces and the effect such practices have on the product. The rolling mill is responsible for defects of a mechanical nature, such as overfills, underfills, laps, scratches, shearing, etc., which necessitate conditioning in the semifinished product. (F23, F21, D2, D9, ST)

54-F. Roller Guides in Modern Merchant Mill Practice. C. S. Lambert. *Iron and Steel Engineer,* v. 28, Feb. 1951, p. 79-87; disc., p. 87-88.

Includes numerous diagrams. (F23)

55-F. Compression-Sized Tubing May Offer Machining Economies. *Steel,* v. 128, Feb. 26, 1951, p. 74-75, 80.

Production and advantages. Rocking dies with tapered grooves form the wall over a mandrel, causing metal to flow both longitudinally and circumferentially, thus improving surface finish and dimensional precision. Bimetal tubes can be processed from telescoped cylinders. (F26)

56-F. Sulphide Precoats Facilitate Metal Forming. John A. Henricks. *Steel,* v. 128, Feb. 26, 1951, p. 76.

A series of new chemical conversion coatings developed for use in extrusion and forming of metals, particularly ferrous metals. Devex Corp. has specialized in a mixed sulfide coating which has a low coefficient of friction, as well as versatile means of application. It can be formed by vapor-phase sulfurization in a controlled atmosphere during annealing, by thermal decomposition of a predipped coating, by the chemical conversion of oxide or scale, or by the usual immersion method in a hot aqueous solution. (F1)

57-F. Advances in Heavy Closed Die Forging; German Counter-Blow Hammer Equivalent to 100,000 Lb. Unit. E. O. Dixon. *Steel Processing,* v. 37, Feb. 1951, p. 63-68, 101.

Forging equipment and other new developments of the past decade. (F22)

58-F. Increasing Drop Forging Die Life. Part III. John Mueller. *Steel Processing,* v. 37, Feb. 1951, p. 79-81.

Relative production and die life with various materials. (F22, T5, SG-j)

59-F. Rolls and Rolling. Part XXIII. Angles. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 39, Feb. 1951, p. 214-222.

Detailed diagrams and discussion of roll-pass diagrams for a wide variety of angle designs. (To be continued.) (F23)

60-F. Notes on the Extrusion of Steel. *Machinery Lloyd* (Overseas Edition), v. 23, Feb. 3, 1951, p. 71.

Brief survey. (F24, G5, ST)

61-F. An Analysis of Some Roll-Pass Designs for Round Sections. D. A. Winton. *Journal of the Iron and Steel Institute,* v. 167, Jan. 1951, p. 31-41.

Schedules of roll passes for reducing billets to round sections are analyzed and compared. The square-diamond and the oval-square sequences require fewer passes than other sequences to reduce a billet to any particular size of round. An approximate relationship exists between area per pass, number of passes preceding it, and billet area. (F23)

62-F. Tyre Rolling Mill; Installation of Grid Controlled Rectifier Equipment. *British Steelmaker,* v. 17, Feb. 1951, p. 79-81.

Includes electrical equipment. Steel tires for railroad cars are produced. (F23, CN)

63-F. Bolts and Nuts; Production by Cold Upsetting or Hot Forging. A. P. Newall. *Iron and Steel,* v. 24, Feb. 1951, p. 70-72.

Development of mass-production methods of bolt and nut manufacture. Physical and metallurgical characteristics required. Recent application of high-frequency heating in forging and heat treatment. (F22, J general, T7, CN)

64-F. New Methods for Control of Thickness in Rolling Strip Metal. W. C. F. Hessenberg and R. B. Sims. *Research,* v. 4, Feb. 1951, p. 92-93.

Recent tests with the BISRA experimental rolling mill show that the relation between the separating force and the smallest distance between the rolls is substantially linear. Resulting equations form the basis of two new methods for automatically maintaining constant thickness during strip rolling. (F23)

65-F. Quality Problems in Rolling of Rail. (In Polish.) Andrezej Wojcik. *Hutnik,* v. 17, May-June, 1950, p. 106-113.

Different operating variables and their influence on the product. Emphasizes influence of the rolling process on microstructure and on physical and mechanical properties. 30 ref. (F23, CN)

66-F. How Big Should Presses Get? Chester Ricker. *American Machinist,* v. 95, Mar. 5, 1951, p. 148-149.

Air Force pilot plant which studies economic possibilities of giant hydraulic forging and extrusion presses, some from Germany. The biggest existing one (33,000 tons) was appropriated by Russia, but presses up to 75,000 tons are under construction. (F22, F24)

67-F. Cold Rolling Strip. An Appraisal of Today's Theory and Practice. J. D. Keller. *Steel,* v. 128, Feb. 19, 1951, p. 76, 78, 80, 82, 85; Mar. 5, 1951, p. 92, 94, 96; Mar. 19, 1951, p. 80, 83, 86.

First installment: recent developments in theory, also pressure curves. Second installment shows that error in calculation of force on the rolls resulting from assumed circular-arc contour is negligibly small. Third installment: Experimental studies indicate that coefficient of friction of the strip, while

being reduced, will vary along the contact length of the strip on the rolls. (To be continued.) (F23)

68-F. Recent Developments in Large Closed-Die Forging. E. O. Dixon. *Machinery* (American), v. 57, Mar. 1951, p. 184-189.

See abstract of "Advances in Heavy Closed-Die Forging; German Counter-Blow Hammer Equivalent to 100,000-lb. Unit," *Steel Processing;* item 57-F, 1951. (F22)

69-F. Improved Dies for the Cutlery Industry. *Metal Treatment and Drop Forging,* v. 18, Feb. 1951, p. 71-74.

Preparation and use of die-blocks made from a proprietary steel which has substantially increased die life. Stages in the production of dessert and carving-knives up to the final trimming. (F22, SS)

70-F. Ringing in Wire-Drawing Dies. J. G. Wistreich. *Journal of the Iron and Steel Institute,* v. 167, Feb. 1951, p. 162-164.

"Ringing," which is a form of grooving of dies near the point of entry of the wire, is an undesirable phenomenon, the suppression of which might result in better die performance. Concludes from experiments that, generally, ringing is not caused by abrasive action of a contaminated lubricant, but is the result of the steep stress gradient at the beginning of the working surface of the die. For this reason ringing cannot be altogether suppressed, but it is possible greatly to reduce its severity by applying heavy back pull to the wire. (F28)

71-F. Hot Bloom and Slab Shears. J. A. Kilby. *Journal of the Iron and Steel Institute,* v. 167, Feb. 1951, p. 165-199.

Apparatus designed for the hot cutting of blooms and slabs more than 6 in. square and 18 in. wide x 2 in. thick, respectively. (F29, ST)

72-F. Measures Rolling Mill Load Continuously. *Iron Age,* v. 167, Mar. 22, 1951, p. 74.

Short steel columns to which SR-4 strain gages are bonded have been installed in the cold roll strip mill at the Edgewater plant of the Aluminum Co. of America. These new load-weighing devices provide accurate, continuous indication of roll loads. (F23)

73-F. The Use of Tungsten Carbide Dies in Wire Drawing and Nail Making. Edward C. Kinyon. *Wire and Wire Products,* v. 26, Mar. 1951, p. 215-217, 260-262.

Includes historical development. (F28, T7, ST, W, C-n)

74-F. Prop Extrusion is Production Milestone. Irving Stone. *Aviation Week,* v. 54, Mar. 19, 1951, p. 27-28, 32, 35.

Process for hot extrusion of one-piece, tapered, hollow steel propeller blades developed by Air Material Command, Curtiss-Wright, and others. (F24, SS)

75-F. Manufacture of Electric Fusion Welded Pipe. J. H. Middleton. *Iron and Steel Engineer,* v. 28, Mar. 1951, p. 66-69.

The submerged-arc electric welded pipe mill provides an economical method of producing large-diameter line pipe. Shearing, forming, and welding operations to make this pipe at Republic Steel Corp.'s Gadsden, Ala., plant. (F26, CN)

76-F. Furnaces for Shell Production. Henry M. Heyn. *Industrial Gas,* v. 30, Mar. 1951, p. 3-5, 24.

Various gas-fired furnaces used in production of high-explosive shells, for annealing, forging, and forming operations. Material is usually carbon steel.
(F21, G general, J23, T2, CN)

77-F. Details of the New 42-In. Slabbing Mill Installed at the Works of John Summers and Sons Ltd. at Shotton. *Sheet Metal Industries,* v. 28, Mar. 1951, p. 219-222, 228.

British mill. (F23)

78-F. The Adherence of Oxide Scales on Copper. R. F. Tylecote. **Appendix on the Temperature of the Oxide Scale on Copper During Hot Rolling.** R. Eborall. *Journal of the Institute of Metals,* v. 78, Dec. 1950, p. 301-326.

The scales formed on pure or tough-pitch Cu and on phosphorus-deoxidized Cu are known to behave very differently during fabrication, the phosphorus-bearing coppers shedding their scales more readily than the phosphorus-free coppers during hot working. A corresponding difference is observed in laboratory tests when specimens are oxidized in air at hot working temperatures and then cooled to room temperature. These differences are explained in terms of mechanical properties of the scales at elevated temperatures. In the appendix an estimate is made of temperatures reached by the oxide scales when a slab preheated to 900° C. is passed through the rolls. Infers that moderate reductions in initial slab temperature would markedly favor exfoliation of the scale.
(F23, R2, Cu)

79-F. Friction in Wire Drawing. H. G. Baron and F. C. Thompson. *Journal of the Institute of Metals,* v. 78, Dec. 1950, p. 415-462.

The magnitude of frictional loss in drawing 65-35 brass wire, using carbide dies with and without parallel extensions. Results confirm the view that the process is more efficient as reduction of area becomes larger. Coefficient of friction between the wire and die is calculated on the basis of the theories of Sachs, of Davis and Dokos, and of Hill and Tupper, respectively. Experiments with "back pull" showed that the relationship between the die load and back-pull is not strictly linear. Effects on friction of a number of variables, using a variety of lubricants. 29 ref. (F28, Cu)

80-F. Lubricants for the Cold Working of Non-Ferrous Metals. S. F. Chisholm. *Journal of the Institute of Metals,* v. 78, Jan. 1951, p. 483-500.

The processes of cold rolling, press drawing, tube drawing, and wire drawing from the point of view of the demands they make on lubricants. Suitable types of lubricant. (F1, G4)

81-F. The Cold Rolling of Non-Ferrous Metals in Sheet and Strip Form. C. E. Davies. *Journal of the Institute of Metals,* v. 78, Jan. 1951, p. 501-536.

Modern technique for rolling Cu and Cu alloys, Al and its alloys. The relative merits of 2-high and 4-high mills for various purposes, and also those of reversing, non-reversing, and tandem units. Refers to mills with minimum work-roll diameters, such as the Sendzimir mill. Considerable attention to auxiliary equipment. (F23, Cu, Al)

82-F. Wire-Drawing Technique and Equipment. F. T. Cleaver and H. J. Miller. *Journal of the Institute of Metals,* v. 78, Jan. 1951, p. 537-562.

Historical development and present-day machines of various types. Die design, die materials, lubricants, speeds of drawing, reductions, and other aspects of wire drawing, and a detailed account of current practice in the production of Cu, brass, bronze, and other Cu-alloy wires, also Al and Al-alloy wire. Various types of defects. (F28, Cu, Al)

83-F. Extruded Hollow Propeller Blades. *Automotive Industries,* v. 104, Apr. 1, 1951, p. 32-33, 74.

New production technique and equipment. Material is Cr-Ni-Mo steel. (F24, AY)

84-F. Aircraft Propeller Blades Hot Extruded Faster. *Steel,* v. 128, Apr. 2, 1951, p. 86, 88.

New process and equipment developed by Curtiss-Wright's Propeller Div., in cooperation with the U. S. Air Force. Material is Cr-Ni-Mo steel. (F24, AY)

85-F. Roll Forging Steel Rings. William H. Newsome. *Steel Processing,* v. 37, Mar. 1951, p. 126-127, 141.

Production experience in fabrication of weldless steel rings. The process consists of using steel rolls and hydraulic pressure to convert prefabricated steel "doughnuts" into rings with outside diameters of 8-76 in., weights of 50-2500 lb., and lengths up to 20 in. (F22, ST)

86-F. Cold Forming of Low-Carbon Steel. Part I. Selection of Steel for Drawing. Lester F. Spencer. *Steel Processing,* v. 37, Mar. 1951, p. 128-131, 153.

Grading of cold rolled sheet; tempers of cold rolled strip; finish of cold rolled strip; coated sheet metal; problems related to deep drawing techniques. (F23, G4, CN)

87-F. Increasing Drop Forging Die Life. Part IV. Effect of Heating Forgings. John Mueller. *Steel Processing,* v. 37, Mar. 1951, p. 132-133.

Recommendations for optimum heating times and temperatures for different carbon and alloy steel compositions. (F21, F22, AY, CN)

88-F. Operation of a Ten Inch Continuous Bar Mill. H. A. Carter. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 39-51.

At Lackawanna plant of Bethlehem Steel Co. Mill problems and limitations, and figures showing what the mill has done up to the present time. (F27, ST)

89-F. The Manufacture of Electric Welded Transmission Pipe. J. H. Middleton. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 79-90.

Mill at Republic Steel Corp. using electric fusion submerged-arc weld process. Preparation and formation of the flat plate into cylinders, welding, and finishing of the pipe. (F26, ST)

90-F. The Use of Tungsten Carbide Dies in Wire Drawing and Nail Making. Edward C. Kinyon. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 159-167.

Development of the wire drawing die, emphasizing the tremendous effect of the tungsten carbide die on the steel wire industry. (F28, T5, ST, C-n, W)

91-F. Source of Rolling Defects. (In German.) Paul Gruner and Theo Bruggemann. *Stahl und Eisen,* v. 71, Jan. 4, 1951, p. 20-28; Jan. 18, 1951, p. 71-77.

Classifies defects in rolled steel into two main classes: those caused by poor raw material and those caused by poor rolling practice. In-

cludes numerous photographs and micrographs. 15 ref. (F23, M28, CN)

92-F. Present-Day Domestic and Foreign Construction of Rolling Mills. (In German.) Theodor Dahl. *Stahl und Eisen,* v. 71, Mar. 1, 1951, p. 229-244.

Design and operation of all sorts of rolling mills, except those used in the production of pipe. Problems for further development. 23 ref. (F23)

93-F. Electronic Shear Control. *Machine Design,* v. 23, Apr. 1951, p. 162.

New flying shear, incorporating photo-electric relays and timer circuits, which serves the dual purpose of cropping the front ends of billets and then cutting them into hot-bed lengths. (F21)

94-F. Extruding Hollow-Steel Tapered-Section Propeller Blades. *Machinery* (American), v. 57, Apr. 1951, p. 190-191.

Process applied to stainless steel blades. (F24, SS)

95-F. New 86-Inch Hot Strip Mill in Production on Pacific Coast. *Steel,* v. 128, Apr. 16, 1951, p. 82, 85.

Four-stand, 4-high unit of Kaiser Steel Corp. which supplies skelp for pipe mill at present but will furnish hot coils to a tin-plate mill when completed. (F23, AY)

96-F. Big Squeeze Applied to Airplane Propellers Cuts Production Time by Hours. *Product Engineering,* v. 22, Apr. 1951, p. 162-163.

Hot extrusion process developed by Propellor Div., Curtiss-Wright Corp. for fabrication of one-piece, hollow, stainless steel propeller blades for high-speed combat and commercial aircraft. (F24, SS)

97-F. Rolls and Rolling. Part XXIV. Angles. (Continued.) E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 39, Mar. 1951, p. 343-350.

Additional roll-pass diagrams and textural description applicable to different forms of angles. (To be continued.) (F23)

98-F. (Pamphlet) **Handbook of Cold Drawn Butt Welded Mechanical Steel Tubing.** 1950, 44 pages. Pittsburgh Tube Co., Pittsburgh.

Welding, finishing, inspection, dimensional tolerances, and physical and mechanical properties of cold drawn, butt welded steel tubing made almost exclusively of low-carbon, openhearth steel. (F26, CN)

99-F. (Book) **Metalworking Lubricants.** E. L. H. Bastian. 1951. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18. $6.00.

The nature, selection, and application of lubricants and fluids. Those used in forming nonmetallic engineering materials, such as plastics, are also analyzed. New lubricants such as molybdenum disulphide, chemically active waxes, water-miscible oils for drawing fine-gage wire, and a variety of synthetic fluids and compounds are covered. (F1, G21)

100-F. The Production of Shells by Cold Extrusion. *Machinery,* v. 78, Apr. 5, 1951, p. 550a-550e.

Work by Mullins Mfg. Corp. in the U. S., using ordinary low-carbon steels. (F24, CN)

101-F. Rolls and Rolling. Part XXV. Angles. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 39, Apr. 1951, p. 439-444.

Roll-pass diagrams. (F23)

102-F. Fundamentals of the Working of Metals. Part XXI. Progressive & Steady-Flow Forming. George Sachs. *Modern Industrial Press,* v. 13, Apr. 1951, p. 6, 8, 44, 46.

Definitions of progressive forming; steady-flow processes — rolling and forging; wiper forming; extrusion forging; and spinning, progressive flanging, and drop-hammer forming. (F22, F23, F24, G13)

103-F. Electric Fusion Submerged-Arc Process Welds Expanded Steel Transmission Pipe. J. H. Middleton. *Steel,* v. 128, Apr. 23, 1951, p. 80, 82, 85, 88, 91-92, 94.

Process used at the Gulfsteel Div. of Republic Steel Corp. which uses twin arcs, spaced about ¼ in. apart, one using alternating current and the other direct current. Speed of welding depends on wall thickness of the pipe being produced, and approximates 4 ft. per min. (F26, K1, ST)

104-F. The Continuous Seamless Pipe Mill. John L. Young. *Iron and Steel Engineer,* v. 28, Apr. 1951, p. 53-58; disc. p. 58-61.

New mills at National Tube Co.'s Lorain plant. (F26, ST)

105-F. Metal Drawing Lubricants for Wire, Tubing, and Sheet Steel. Walter A. Smigel and H. Grey Verner. *Iron and Steel Engineer,* v. 28, Apr. 1951, p. 97-102; disc. p. 102-106. (F1, ST)

106-F. Developments in Large Closed Die Forging. E. O. Dixon. *SAE Quarterly Transactions,* v. 5, Apr. 1951, p. 143-150.

See abstract of "Advances in Heavy Closed Die Forging; German Counter-Blow Hammer Equipment to 100,000 L.b. Unit," *Steel Processing,* item 57-F, 1951. (F22)

107-F. New Roll-Forging Process. Frank Charity. *Machine and Tool Blue Book,* v. 47, May 1951, p. 128-130, 132.

Process of using steel rolls and hydraulic pressure to convert prefabricated steel "doughnuts" into rings. Rings may range from 8 to 76 in. o.d.; lengths up to 20 in. (F22, ST)

108-F. Cold Working of Stainless Steels. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 23, Mar. 31, 1951, p. 111, 113-114.

Special precautions employed in cold rolling. (F23, SS)

109-F. Cold Rolling Copper Alloys. C. E. Davies. *Metal Industry,* v. 78, Mar. 30, 1951, p. 243-246, 251.

First part of a condensation of "The Cold Rolling of Non-Ferrous Metals in Sheet and Strip Form," *Journal of the Institute of Metals.* See item 81-F, 1951. (F23, Cu)

110-F. Rolling Aluminium and Its Alloys. C. E. Davies. *Metal Industry,* v. 78, Apr. 6, 1951, p. 262-266; disc. p. 266-268.

Condensed from a portion of "The Cold Rolling of Non-Ferrous Metals in Sheet and Strip Form," *Journal of the Institute of Metals.* See item 81-F, 1951. (F23, Al)

111-F. Improving the Quality of Drawing Dies by Controlling the Form of the Die Aperature With Modern Measuring .Methods. (In German.) Werner Lueg. *Stahl und Eisen,* v. 71, Feb. 15, 1951, p. 157-167; disc., p. 167-170.

Design factors and methods for determining the internal dimensions of the wiredrawing die aperature. (F28)

112-F. Tubing to Close Tolerances. L. A. Karg. *Machinery* (American), v. 57, May 1951, p. 164-169.

Equipment and methods used in producing compression-formed seamless tubing in a variety of shapes, sizes, and materials by a special cold-reduction process—the "Rockrite" process. (F26)

113-F. Steel Quality as Affected by Track Time and Soaking Pit Practice. A. F. Mohri. *American Iron and Steel Institute,* Preprint, 1951, 14 pages.

It is believed that specification of minimums and maximums for track times, soaking-pit heating, and soaking are of assistance in controlling quality of the finished product; and keep the necessity for conditioning this product to a minimum. (F21, ST)

114-F. High Speed Rod Bakers Expedite Production at J & L Wire Mill. *Industrial Heating,* v. 18, Apr. 1951, p. 679-680, 682, 684.

Furnace equipment for processing steel-rod coils. The baking operation follows pickling, rinsing, and line dipping and precedes drawing. (F28, ST)

115-F. Forging Operations in Steam and Diesel Locomotive Practice. Part I. Diesel Forgings. R. E. W. Harrison. *Steel Processing,* v. 37, Apr. 1951, p. 169-171.

Plain-carbon and alloy steels are used. (F22, CN, AY)

116-F. The Extrusion of Soft Metals —Principles and Applications. Andrew E. Rylander. *Tool Engineer,* v. 26, May 1951, p. 53-60.

The four methods commonly used: slow pressure; direct; indirect; and impact. (F24, G5, EG-a)

117-F. For Best Forming Results Use the Right Lubricant. E. L. H. Bastian. *Steel,* v. 128, May 7, 1951, p. 116-119, 130, 133.

Selection of lubricants for press drawing, hot and cold forging, and hot and cold extruding. Practical tips for selecting lubricants to facilitate forming of carbon and low-alloy steels, stainless, Cu and brass, Mg, and Al. (F1, G21)

118-F. Extruded Steel Propeller Blades Save Materials—Manpower—Machining—Tools. *Magazine of Tooling and Production,* v. 17, May 1951, p. 70, 72, 153.

New mass-production method of hot extruding one-piece, hollow-steel propeller blades for high-speed combat and commercial aircraft. (F24, ST)

119-F. The Reduction of Residual Stresses in Cold-Drawn Bars. H. Bühler and E. H. Schulz. *Engineers' Digest,* v. 12, Apr. 1951, p. 123-125. (Translated and condensed.)

Previously abstracted from *Stahl und Eisen.* See item 21-F, 1951. (F27, CN)

120-F. Plant Difficulties in Seamless Tube Manufacture. F. Maslyn. *Australasian Engineer,* v. 44, Mar. 7, 1951, p. 54-60.

Fractures, galling, and mill defects. (F26, ST)

121-F. Lubricants in Cold Working. S. F. Chisholm. *Metal Industry,* v. 78, Apr. 13, 1951, p. 283-285; disc., p. 285-286.

Previously abstracted under similar title from *Journal of the Institute of Metals.* See item 80-F, 1951. (F1, G4)

122-F Patenting and Drawing Tests on Austenitic Coarse and Fine-Grained Steel Wires and the Effect of Small Contents of Carbide-Forming Alloy Additions. (In German.) Werner Papsdorf. *Archiv für das Eisenhüttenwesen,*

v. 22, Mar.-Apr. 1951, p. 87-98. 27 ref. (F28, J25, ST)

123-F. Rolls and Rolling. Part XXVI. Angles. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 39, May 1951, p. 553-560.

Additional roll-pass diagrams and descriptive material. (F23)

124-F. Big Forgings Ahead. *Product Engineering,* v. 22, May 1951, p. 120-121.

Development of larger forgings based on German work and machines. (F22)

125-F. Wisconsin Plant Operating Huge Forging Hammer. *SAE Journal,* v. 59, May 1951, p. 34-35. (Based on "Developments in Large Closed Die Forging," by E. O. Dixon.)

Previously abstracted from complete paper in *SAE Quarterly Transactions.* See item 106-F, 1951. (F22)

126-F. Cold Rolling Strip: An Appraisal of Today's Theory and Practice. (Continued.) J. D. Keller. *Steel,* v. 128, Mar. 26, 1951, p. 84, 86, 89; May 14, 1951, p. 98, 100, 103-104.

Mar. 26: reasons why an increase in rolling speeds causes a decrease in friction coefficient, and the importance of lubrication as related to coefficient of friction. May 14: conflicting factors which indicate that additional experimental information is necessary to determine compressive strength of strip. Meanwhile, tensile-test values are recommended for normal rolling of strip in conjunction with a multiplying factor not greatly in excess of unity. (F23, Q28, ST)

127-F. Cold Rolling Technique: The Application of Theory and Experiment to the Practice of Rolling; Methods of Calculating Roll Force and Torque Based on Theories of Rolling. (Continued.) Hugh Ford. *Sheet Metal Industries,* v. 28, May 1951, p. 427-434, 438.

Detailed mathematical analysis and description of various methods. (To be continued.) (F23)

128-F. Large Cast Brass Cakes Heated in Continuous Cycle at American Brass Plant. *Industrial Heating,* v. 18, May 1951, p. 806, 808, 810.

Describes large furnace which heats cast brass cakes weighing up to 3200 lb. each to a temperature of 1300-1500° F. preparatory to reduction by hot rolling to slabs less than ½ in. thick and up to 85 ft. long. It produces up to 40,000 lb. of cakes per hr. in a continuous cycle. (F21, Cu)

129-F. Rolling of Tool Steels. H. C. Bigge. *Iron and Steel Engineer,* v. 28, May 1951, p. 57-65; disc., p. 65-66.

Classifies toolsteels into 6 basic groups. Equipment and procedures used by Bethlehem Steel Co. Approximate compositions are tabulated. Roll passes are diagrammed. Includes forging and heating equipment and procedures. (F23, TS)

130-F. Alloy Steel Prop Blades Made by Hot Extruding. *Materials & Methods,* v. 33, May 1951, p. 66-68.

Picture story of new process developed by Curtiss-Wright and U. S. Air Force engineers. (F24, SS)

131-F. The Counter-Blow Forging Hammer; Its Design and Application. Bernard Anscher. *Steel Processing,* v. 37, May 1951, p. 226-230, 257.

Models of the counter-blow hammer which Hydropress, Inc., has designed; compares them with conventional American drop hammers. (F22)

132-F. Increasing Drop Forging Die Life. Part V. Effect of Hammer Size. John Mueller. *Steel Processing,* v. 37, May 1951, p. 235-236, 250.

Includes tabular and graphical recommendations for choice of hammer size. (F22)

133-F. Forging Operations in Steam and Diesel Locomotive Practice. Part II. Steam Engine Forgings and Heat Treatment. R. E. W. Harrison. *Steel Processing,* v. 37, May 1951, p. 239-244. 25 ref. (F22, J general, ST)

134-F. American Steel and Wire Stainless Steel Plant at Waukegan. *Wire and Wire Products,* v. 26, May 1951, p. 394-397, 439.

Equipment and procedures. Annealing, cleaning and finishing, and cold rolling are applied to some of the material, in addition to wire drawing. (F28, J23, L general, SS)

135-F. Forging Methods. J. C. Stevens. *Engineering,* v. 171, May 4, 1951, p. 541-543. (A condensation.)

Practice of producing heavy steel forgings from early years to present. Modern production of hollow forgings by three methods. (F22)

136-F. Production of 20-Pounder Shells. *Engineering,* v. 171, May 11, 1951, p. 573-574.

Equipment and procedures of British plant. Includes forging, shearing, flame cutting, piercing, machining, etc. Material is steel. (F22, G general, T2, ST)

137-F. Cold Rolling With Strip Tension. Part I. A New Approximate Method of Calculation and a Comparison With Other Methods. H. Ford, F. Ellis, and D. R. Bland. *Journal of the Iron and Steel Institute,* v. 168, May 1951, p. 57-72.

By making certain approximations to Orowan's general theory of rolling, it is possible to calculate roll forces and torque by a method which is both rapid and easy to apply, using basic information on yield-stress characteristics of the material to be rolled, coefficient of friction, and dimensions of the pass. Roll-force and roll-torque functions used in the calculations are shown by graphical form. The methods of Orowan, Hill, Siebel, Tselikov, and Nadai, are compared with the new method for a wide range of tensions. (F23)

138-F. Ringing in Wire-Drawing Dies. J. G. Wistreich. *Wire Industry,* v. 18, May 1951, p. 461, 463, 465.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 70-F, 1951. (F28)

139-F. Save $2000 by Flame Straightening. *Industry & Welding,* v. 24, June 1951, p. 38.

Use by a West Coast fabricator to strighten about a hundred heat-warped steel boxes each year. (F29, CN)

140-F. Dies Hardfaced With Alloy Last Longer. Arthur Gray. *Iron Age,* v. 167, May 31, 1951, p. 68-70.

Applications of hard facing with a Ni-base alloy to multiply life of forging dies used to forge high-alloy steels. The alloy has been used mainly for high temperature aeronautical and heat treating applications. It is now being used in steel mills for rebuilding hot shear blades, shafts, dies, entry guides, and bearing surfaces. (F22, L24, AY, Ni)

141-F. New Roll Reduces High-Speed Steel Ingots. *Iron Age,* v. 167, June 7, 1951, p. 116.

Reduction of high-speed toolsteel ingots to billet form by rolling instead of hammering and forging has been made possible for the first time by use of a new cast steel roll. The roll is cast from a soft, tough Cu-Mo alloy steel. (F23, T5, TS, AY)

142-F. Extruding Copper and Brass. W. W. Cotter. *Journal of Metals,* v. 3, June 1951, p. 440-442.

One type of tube-extrusion press for these metals. Development and present status of the process. (F24, F26, Cu)

143-F. Some Industrial Experiences With Synthetic Lubricants. C. H. Sweatt and T. W. Langer. *Mechanical Engineering,* v. 73, June 1951, p. 469-476.

The fluids discussed are polyalkylene glycols and their derivatives. A number of specific experiences under widely different operating conditions include metalworking operations as well as lubrication of machine parts. (F1, G21)

144-F. The Topock-Milpitas Gas Pipeline, California. *Engineering,* v. 171, May 25, 1951, p. 613-616.

Rolling, forming, and welding operations in production of 34-in. high-Mn steel pipe. (F26, K general, CN)

145-F. Wire-Drawing Die Bores. R. M. J. Withers. *Metal Treatment and Drop Forging,* v. 18, May 1951, p. 191-194.

Surveys methods for examining profiles of the bores. Some of the optical and mechanical methods and instruments used for this purpose. (F28, S14)

146-F. Investigations Into the Causes of Drop Forging Faults. Hermann Rauhaus. *Metal Treatment and Drop Forging,* v. 18, May 1951, p. 205-213. (Translated and condensed.)

Previously abstracted from *Stahl und Eisen.* See item 112-F, 1950. (F22, ST)

147-F. Redrawing as a Means of Reducing Internal Stresses Resulting From Cold Drawing of Metal Bars. (In German.) H. Böller. *Metall,* v. 5, May 1951, p. 195-198.

New process based on the discovery that relatively slight redrawing of steel and brass reduces internal stresses by more than 50%. The process is more economical than annealing and does not impair the mechanical properties and surface condition of the metal. 12 ref. (F27, Q25, CN, Cu)

148-F. Production of Toolsteel Drawing Tools for the Production of Bright Steel. (In German.) Fritz Boehm. *Stahl und Eisen,* v. 71, May 10, 1951, p. 522-523.

Proposes a new hole design for dies for the drawing of round, hexagonal, and square bars. Old and new shapes are diagrammed and proposed dimensions are tabulated. (F-27)

149-F. The Effect of Impurities on the Processing of Copper. (In German.) Otto Nielsen. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, May 1951, p. 169-176.

Effects of different inclusions in commercial Cu with emphasis on effects of oxides on hot and cold working, drawing, and welding. 22 ref. (F general, G general, K general, Cu)

150-F. Concerning Elimination of a Rolling Defect. (In Italian.) Adolfo Antonioli and Renato Rolla. *Metallurgia Italiana,* v. 42, Nov. 1950, p. 418-420.

Small longitudinal defects on rolled round bars of Si-Mn spring

steel were found to result from two successive passes without rotating the bar. Modification of the roll-pass designs results in elimination of the defect. (F23, AY)

151-F. Integrally-Stiffened Sections Are Extruded. O. L. Mitchell. *Iron Age,* v. 167, June 14, 1951, p. 92-95.

Use of extrusion for production of sections in 24S and 75S Al. At present, production is for military experimental use, but plans are made to make this material commercially available as soon as possible. Relatively wide sections open a new field of design in all branches of engineering. (F24, Al)

152-F. New Device Increases Hammer's Operational Flexibility. *Steel,* v. 128, June 18, 1951, p. 80.

Control which enables the operator of this gravity-drop hammer to select either a long or short stroke of the ram at will. It increases the hammer's operational flexibility by making it possible to strike a series of short blows for rolling, drawing, fullering or edging; and then without interruption to strike a series of long blows for forging in the breakdown, rough, or finished impression of the forging die. (F22)

153-F. Steel Quality as Affected by Track Time and Soaking Pit Practice. A. F. Mohri. *Blast Furnace and Steel Plant,* v. 39, June 1951, p. 665-670.

Previously abstracted from *American Iron and & Steel Institute,* Preprint. See item 113-F, 1951. (F21, ST)

154-F. Recent Experiences in Copper Wire Drawing. W. Hodgkins. *Industrial Diamond Review,* new ser., v. 11, May 1951, p. 111-113.

Operations at a cable-manufacturing company, using sintered-carbide and diamond dies. (To be continued.) (F28, Cu)

155-F. Theory of Hollow Sinking of Thin-Walled Tubes. S. Y. Chung. *Metallurgia,* v. 43, May 1951, p. 215-218.

Using a modified criterion of plastic yielding, the author discusses the theoretical aspects of hollow sinking and compares his theoretical stresses with previously published experimental results on highly pre-strained phosphorus-deoxidized Cu and soft brass, and his predicted strains with recent research data on Al and brass. (F26, Cu, Al)

156-F. The Continuous Merchant Mill. L. C. Sowell. *Iron and Steel Engineer,* v. 28, June 1951, p. 72-76; disc., p. 76.

Aliquippa straight-away 14-in. continuous merchant mill, with some mention of a semi-continuous cross-country mill located at Hazelwood. Advantages and disadvantages of the two types. (F23)

157-F. Rolling Solutions for Specialty Steels. Maxwell L. Bible. *Iron and Steel Engineer,* v. 28, June 1951, p. 91-93; disc., p. 93-94.

Selection of rolling lubricants and coolants for stainless steels. (F1, SS)

158-F. Light-Alloy Extrusions. E. Austyn Reynolds. *Light Metals,* v. 14, June 1951, p. 309-311.

Procedures and equipment for production. (F24, Al)

159-F. How to Push Metal Around for Profit. *Modern Industry,* v. 21, June 15, 1951, p. 40-45.

Recent developments in production of automotive and aircraft parts by hot and cold forging, extrusion, and stretch-press forming, and large economies thereof. (F22, F24, G9)

160-F. England's New Aluminium Rolling Mill: 50,000 Tons of Sheet and Strip Per Year. *Modern Metals,* v. 7, June 1951, p. 45-48.

(F23, Al)

161-F. Precision Rolling Thin-Gage Magnetic Alloys. *Steel,* v. 128, June 25, 1951, p. 114.

New Sendzimir cold strip mill capable of rolling ultrathin alloy ribbon stock in widths up to 8½ in. from a maximum thickness of 0.025 in. down to 0.0005 in. (F23, SG-n, p)

162-F. Wire for Fasteners. S. W. McDermott. *Wire and Wire Products,* v. 26, June 1951, p. 489-491, 509-510.

Kinds of steel wire best suited to cold-heading work. Equipment and procedures. Macrographs show structures of different billets and wire drawn from them. Presence of an extensive rimmed area is desirable. (F28, T7)

163-F. The Extrusion of High-Purity Magnesium Alloys. H. G. Warrington. *Canadian Mining and Metallurgical Bulletin,* v. 44, June 1951, p. 424-428.

Reduction of number of alloys produced from 7 to 4 as an aid to economical production at Dominion Magnesium, Ltd., Canada. Applications and future prospect. (F24, Mg)

164-F Producing Tube and Section by Using Electric Resistance Welding. *Machinery Lloyd* (Overseas Edition), v. 23, May 26, 1951, p. 99-101.

Equipment and procedures. (F26, ST)

165-F. A New Approach in the Preparation of Forging Blanks. H. E. Hows. *Metal Treatment and Drop Forging,* v. 18, June 1951, p. 274-278.

New type of equipment called the "Reduceroll," by which considerable economies in die costs are achieved. One pair of 3-groove rolls have handled over 200,000 billets without appreciable wear. Equipment and some of its products. (F22)

166-F. Empirical and Graphical Method for Determination of Force Applied During Drawing. (In Polish.) M. Schneider and R. Wusatowski. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 1, 1951, p. 11-16.

Several diagrams showing relationship of drawing force, coefficient of deformation efficiency, Brinell hardness, yield strength, and reduction in area, based on Lueg and Pomp's results. Empirical formula for calculation of drawing force chosen. Results of experiments on low-carbon steel are in agreement with this formula. By its use, a nomogram for rapid calculation of drawing force was prepared. (F27)

167-F. Metal Flow, Elongation, and Spread in Regular Sections. (In Polish.) Z. Wusatowski and A. Wojtylak. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 1, 1951, p. 23-46.

Theoretical fundamentals for quantitative determination of metal flow during rolling of regular sections. Calculations are based on Z. Wusatowski's formulas for coefficients of elongation and spread, and on A. Lendl's formula for coefficient of mean elongation of total cross-section. Metal flow during rolling of regular sections, such as equal angles, tees, channels, and double-tees was calculated. Comparison between calculated and obtained dimensions after a single rolling pass indicated good agreement. (F23)

168-F. How to Approach Shell Forging Problems. K. N. Mills. *Iron Age,* v. 168, July 5, 1951, p. 90-94.

Limitations and problems associated with the various forging methods used in the production of artillery shells. How solution to such problems as forging symmetry, cavity and surface defects, and cracks can be achieved by careful analysis and application of basic engineering principles. (F22, T2, ST)

169-F. Forging Clutch Pedals at Dodge Plant. John C. McComb. *Steel Procesing,* v. 37, June 1951, p. 273-275. (F22, T21)

170-F. Steel Processing Forum: Disputes Claims on Counter-Blow Forging Hammer. Macdonald S. Reed. *Steel Processing,* v. 37, June 1951, p. 293-296.

Comments on the article, "The Counterblow Forging Hammer—Its Design and Applications," by Bernard Anscher in *Steel Processing.* See item 131-F, 1951. (F22)

171-F. Kaiser Steel's New 86-Inch Hot Strip Mill. *Western Metals,* v. 9, June 1951, p. 38-39.

Equipment illustrated. (F23)

172-F. Thin Sheets; Hot Mill Technique in Pack Rolling. John H. Mort. *Iron and Steel,* v. 24, June 15, 1951, p. 235-241.

Approximate dimensions of the sheets referred to are widths of 2-3 ft., lengths of 6-10 ft., and thicknesses of 0.0087-0.0123 in. The technique is also applicable in large measure to manufacture of sheets 0.004-0.006 in. thick. Galvanizing procedure and details of rolling practice, including calculations. (F23, L16, CN, Zn)

173-F. The Effect of Tension on Torque and Roll Force in Cold Strip Rolling. W. C. F. Hessenberg and R. B. Sims. *Journal of the Iron and Steel Institute,* v. 168, June 1951, p. 155-164.

Problem was studied on the BISRA experimental rolling mill. Simple approximate formulas for calculating effect of tension on roll force and torque are proposed, and comparison is made between calculated and experimental results. Difficulties inherent in more elaborate methods of calculation. Tables show results of tests on annealed and prestrained mild steel. 11 ref. (F23, CN)

174-F. The American Non-Ferrous Metals Industry; Productivity Team Report on Wire and Other Materials. *Wire Industry,* v. 18, June 1951, p. 528-532, 535. (A condensation.)

Wiredrawing, rod rolling, bright annealing, tinning, cold rolling of commutator sections, etc., of copper and steel. (F28, F23, F27, Cu, ST)

175-F. Friction in Wire Drawing. H. G. Baron and F. C. Thompson. *Wire Industry,* v. 18, June 1951, p. 543-546, 549-550.

Previously abstracted from *Journal of the Institute of Metals.* See item 79-F, 1951. (F28, Cu)

176-F. Drawing of Wire From Steels Contaminated With Chromium or Copper. (In German.) Wilhelm Püngel. *Archiv für das Eisenhüttenwesen,* v. 22, May-June 1951, p. 143-148.

A gradual increase in the Cr and Cu contents of steel wire because of the use of alloy scrap has resulted in greater tendency toward crack formation during wiredrawing. Effects of percentage Cu and Cr, annealing and patenting procedure, of Ni additions, of degree of drawing after patenting, of steel-production process (openhearth or electric), of hot working, etc., on crack formation. (F28, Q general, CN)

177-F. The Effect of McQuaid-Ehn Grain Size on the Drawing Properties of Patented Steel Wire. (In German.) Philipp Günther. *Archiv für das Eisenhüttenwesen,* v. 22, May-June 1951, p. 149-154.

Drawing tests with steels having

coarse, medium, and fine-grained austenite showed that grain size has little effect on properties of the wires, provided that total reduction in cross section does not exceed 85%. If the degree of deformation exceeds this amount, coarse-grained steels are superior to the others in that the resulting wires are stronger and tougher. (F28, M27, CN)

178-F. Rolls and Rolling. Part XXVII. Bulb Angles. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 39, July 1951, p. 800-812.

The bulb angle, which is an unequal leg angle with a bulb attached to the end of the long leg, is produced in two series, the shipbuilding type and the car-building type. Rolling methods and roll-pass diagrams. (F23)

179-F. Manufacture of Resistance-Welded Steel Tubing in America. *Engineer,* v. 191, June 29, 1951, p. 873-876.

Operations at Electricweld Tube Div., Jones and Laughlin Steel Corp., Oil City, Pa. (F26, ST)

180-F. Rolling. J. Lomas. *Machinery Lloyd* (Overseas Ed.), v. 23, June 23, 1951, p. 87, 89-90.

Compares the rolling of steel with forging. Changes in the properties of a material with rolling. Other practical factors concerned with the rolling process. Nomenclature and classification of rolling mills. (F23)

181-F. (Book) **Impact Die Forging.** 70 pages. Chambersburg Engineering Co., Chambersburg, Pa. $1.50.

The Chambersburg Engineering Co. with the cooperation of the School of Engineering of Princeton University, has prepared a series of charts that form the main part of this booklet. Organized primarily for the convenience of instructors in technical and engineering schools either to form the basis of their courses or to supplement such courses. (F22)

182-F. Recent Furnace Installations by Alcoa for Production and Fabrication of Aluminum. Part II. Aluminum Fabrication at Davenport, Iowa. *Industrial Heating,* v. 18, July 1951, p. 1170-1172, 1174, 1176, 1178, 1180-1181, 1184.

Plant equipment and operations. (F21, A1)

183-F. High-Frequency Heating of Forging Billets. *Metal Progress,* v. 60, July 1951, p. 70-73.

Equipment used in a forge plant at Bromsgrove, England, using high-frequency current as heating medium. The installation deserves attention because of its design and diversity of product, and because of the fine working conditions and labor-saving arrangements. (F21)

184-F. Integrated Phosphatizing System Brings Economies in Cold Drawing. *Steel,* v. 129, July 23, 1951, p. 71-72.

Chemically bonded lubrication film trims scrap losses, lessens die maintenance in forming operations on tube, wire, rod and flat stock. Coating is a specially formulated phosphate which can be applied by immersion, flooding or spraying to form a strong, adherent film chemically bonded to the steel. (F1, G21, ST)

185-F. Design and Operation of High-Speed Production Tube Mills. Donald H. Fleig. *Welding Journal,* v. 30, July 1951, p. 589-596.

Various operations performed in a modern resistance welding tube mill are examined with a view to their coordinated functioning so as to bring about very high-speed production. Speeds from 100-200 ft. per min. are considered. (F26, CN)

186-F. The Use of Basic Open-Hearth Semi-Killed Steels in the Manufacture of Wire Mill Products. Kenneth P. Campbell. *Wire and Wire Products,* v. 26, July 1951, p. 571-573, 618-619.

Processes and material used at the Sheffield Steel Corp. (F28, ST)

187-F. Wire Mill Practices at Republic Steel Corp.'s Gadsden Plant. A. D. Gordon. *Wire and Wire Products,* v. 26, July 1951, p. 568-570, 622-623.

Operations and equipment. (F28, ST)

188-F. New Copper Alloy Developed by American Brass. *Wire and Wire Products,* v. 26, July 1951, p. 598-599.

Alloy developed for strip, wire, sheet, rod, and tube. (F general, Cu)

189-F. New Lubricant Coating Aids Cold Working of Steel. *Science News Letter,* v. 60, July 28, 1951, p. 57.

A new method which consists of cleaning, pickling, and application of a phosphate coating. A heat resistant lubricating surface is formed which is chemically interlocked with the steel. (F1, ST)

190-F. Cold Rolling Strip; An Appraisal of Today's Theory and Practice. Parts VI-VIII. (Concluded.) J. D. Keller. *Steel,* v. 129, July 9, 1951, p. 86, 90, 93; July 23, 1951, p. 78, 80, 84, 87; Aug. 13, 1951, p. 88, 91-92, 94.

Part VI: problems encountered in the strip mill operation, including wavy edges, breakages at the weld, pickup of particles, mill vibration, and skidding. Part VII: it is emphasized that the speed of rolling affects the thickness of the strip. Thickness of oil film in backup roll bearing also has an influence on rolling strip. Part VIII: explains why rolls become stiffer under high-

speed rolling. Reason for end thrust and spalling of rolls. Tungsten carbide rolls. (F23, Cn)

191-F. Metallic Recuperators for Slab Heating Furnaces. R. R. Shedd. *Iron and Steel Engineer,* v. 28, July 1951, p. 55-62.

Installation of metallic tube-type recuperators on slab-heating furnaces on an 80-in. hot strip mill. Operating records. (F21, ST)

192-F. Acceleration Characteristics of Tandem Cold Reduction Mills. W. R. Harris and R. W. Moore. *Iron and Steel Engineer,* v. 28, July 1951, p. 63-72; disc., p. 72-73.

Information on design. Compares "acceleration lag" with "acceleration torque". Includes circuit diagrams. (F23, ST)

193-F. Forging of High-Alloy Steel Aided by Discovery. *Steel Processing,* v. 37, July 1951, p. 343, 352-353.

A recent patented discovery which enables difficult-to-work high-alloy steel to be forged and rolled easily. It involves addition of Ce to the steel. (F22, F23, AY, Ce)

194-F. New Process Speeds Cold Working, Extrusion of Steel. *Product Engineering,* v. 22, Aug. 1951, p. 172-173.

Foscoat Process developed jointly by Pennsylvania Salt Manufacturing Co. and Heintz Manufacturing Co. Impressive results have been obtained in such applications as tube drawing, wire drawing, deep drawing (ironing), deep stamping, cold heading, and similar cold-working operations. (F1, G21, ST)

195-F. On the Mechanism of Disruption of High-Alloyed Steels During Forging. M. V. Rastegaev. *Engineers' Digest,* v. 12, July 1951, p. 218-220, 235. (Translated and condensed.) Aug. 1950. p. 1183-1188.

Previously abstracted from *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences. See item 271-F, 1950. (F22, Q26, AY)

196-F. Art of Roll Pass Design. Ross E. Beynon. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 156-163.

A large number of roll pass details. Schematic diagrams. (F23)

197-F. Semifinished Steel. Karl L. Fetters and H. H. Hottel. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 164-177.

Deals with the steel ingot from the time it is taken from the mold until it is delivered to a finishing mill as a slab, billet, bloom, or as skelp or large wire rods. (F21, ST)

198-F. Structural Shapes and Rails. Frederick M. Gillies and Wilbur E. Dittrich. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 178-193.

A historical survey; types of mills used in rolling; design of equipment. (F23, ST)

199-F. Merchant Shapes. Fred S. High. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 194-199.

Various methods of rolling into bar shapes such as rounds, squares, flats, hexagons, octagons, angles, channels, and tees. (F23, ST)

200-F. Bars. C. W. Barrett. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 200-209.

The process of making bars from blooms or billets. Mills and techniques employed. (F23, ST)

201-F. Plates. W. Louis Bunting. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 210-229.

History of iron and steel plate production. Operational sequence of the rolling process. (F23, ST)

202-F. Butt and Lap Welded Pipe and Conduit and Electric Metallic Tubing. H. E. Engelbaugh. "ABC of Iron and Steel. Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 230-239.

Surveys the advancement of pipe manufacture from early times to the present. The lap weld, old-type butt weld, and the new continuous butt weld processes. (F26, ST)

203-F. Seamless Steel Pipe and Tubes Bryant Bannister. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 240-251.

Surveys the manufacture of seamless tubular products. The numerous and varied steps in the conversion of molten steel into pipe are presented schematically. (F26, ST)

204-F. Wire and Wire Rods. Kenneth B. Lewis. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 252-267.

Various methods for production. (F28, ST)

205-F. Strip and Sheets Hot and Cold-Rolled. Charles L. McGranahan. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 268-323.

Surveys the industry. Covers all the operations performed from the ingot to the finished hot or cold rolled sheet. (F23, ST)

206-F. Forgings. Waldemar Naujoks. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 366-377.

Development of the forging industry. Equipment in use and the various forms produced. (F22, ST)

207-F. A Strip Mill Flying Shear. *Canadian Metals,* v. 14, July 1951, p. 10-11, 14.

Problem of cutting to exact length hot strip travelling over 1000 ft. per min. (F29)

208-F. Aluminium-Alloy Forgings—A Note on Progress. Part II. C. Wilson. *Light Metals,* v. 14, July 1951, p. 367-370.

Die forging, heat treatment of forgings, and future trends. Illustrated. (F22, J general, Al)

209-F. Friction in Wire Drawing. III. The Coefficient of Friction in Wire Drawing. H. G. Baron and F. C. Thompson. *Wire Industry,* v. 18, July 1951, p. 629-633, 635.

Theories of wire drawing, and back-pull experiments and their application in calculating the coefficient of friction. 18 ref. (F28)

210-F. Effect of Warm-Working on an Austenitic Steel (G18B). G. T. Harris, and W. H. Bailey. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 60-67.

Mechanical properties both on an experimental basis and in production. The effect of turbine disk size on the actual properties, and methods for the partial warm working of large disks. Future developments of the warm-working process apart from the gas-turbine disk field. (F general, SS, T25)

211-F. Hot Forging Tests on Some Copper-Base Alloys. A. L. Simmons. *Australian Journal of Applied Science,* v. 2, Mar. 1951, p. 76-88.

Hot forging tests carried out on a series of copper-base alloys to determine whether such tests could be used to predict the behaviour of the alloy in hot rolling. The relative plasticity of the alloys correlated well with the known relative plasticity during hot rolling, but gave no indication of the hot shortness commonly experienced with some of the alloys when hot rolled. Data are tabulated. 12 ref. (F23, Cu)

212-F. Scarfing and Gouging With the Blow-Pipe. (In French.) H. Renaudie. *Soudure et Techniques connexes,* v. 5, May-June 1951, p. 109-120; disc., p. 120-122.

Advantages of time, possibility of crust-removal, cleanliness, avoidance of further refinishing, and cutting down on costs by utilization of blow-pipe deseaming. Suitability of a similar process, gouging, for larger pieces. (F21, ST)

213-F. Shaping of Steel Plate. (In French.) R. Dupas. *Métallurgie et la Construction Mécanique,* v. 83, June 1951, p. 463-465.

Stamping, hammering, elongation, cambering, cutting, and punching. (F29, ST)

214-F. Extruded Gear Stock. *American Machinist,* v. 95, Aug. 20, 1951, p. 112.

Presents a table of dimensions of typical extruded sections. Types of materials which can be extruded include Cu, brass, bronze, and some Ni-silver and phosphor-bronze alloys. Process is believed also applicable to Al alloys. (F24, Cu, Al)

215-F. Lubricant Practice in the Forming of Metals. E. L. H. Bastian. *Better Enameling,* v. 22, Aug. 1951, p. 10-17, 22-23.

Abstracted from "For Best Forming Results Use the Right Lubricant," *Steel,* item 117-F, 1951. (F1, G21)

216-F. Rolls and Rolling. Part 28. Z Bars. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 39, Aug. 1951, p. 958-966.

Roll-pass profiles for production of a variety of types of Z-sections. (F23)

217-F. How Two New Plants Make Steel and Big Pipe. Arthur Q. Smith. *Industrial Gas,* v. 30, Aug. 1951, p. 3-5, 20-23.

Procedures and equipment of Sheffield Steel Corp. and A. O. Smith Corp. Operations are openhearth steelmaking, pickling, forming and welding. Emphasis is on uses of natural gas. (F26, ST)

218-F. Steel Quality as Affected by Track Time and Soaking Pit Practice: I. A. F. Mohri. *Industrial Heating,* v. 18, July 1951, p. 1217-1218, 1220, 1222, 1322, 1324; Aug. 1951, p. 1405-1406, 1408, 1410, 1412, 1414.

Previously abstracted from American Iron and Steel Institute. Preprint, 1951. See item 113-F, 1951. (F21, ST)

219-F. Fundamentals of the Working of Metals. Part 25. Multi-Impression Die Forming. George Sachs. *Modern Industrial Press,* v. 13, Aug. 1951, p. 20, 22.

How complex parts are formed from bar stock by use of multi-impression dies, combined with drop forging or upset forging. Drop-hammer forming of sheet-metal parts. (F22, G1)

220-F. Cold Rolling Technique; The Application of Theory and Experiment to the Practice of Rolling. Hugh Ford. *Sheet Metal Industries,* v. 28, Aug. 1951, p. 693-704.

Methods of calculating roll force and torque based on theories of

rolling. Concludes a series which has been running since 1948. (F23)

221-F. A Note on the Cold Rolling of Very Thin Strip. R. Hill and I. M. Longman. *Sheet Metal Industries,* v. 28, Aug. 1951, p. 705-706.

Calculation of the minimum thickness that can be rolled to a given percentage reduction. (F23)

222-F. Factors Affecting the Selection of Wire Drawing Equipment. R. A. Duke. *Wire and Wire Products,* v. 26, Aug. 1951, p. 676-677, 692. (F28)

223-F. Friction in Wire Drawing. (Concluded.) H. G. Baron and F. C. Thompson. *Wire Industry,* v. 18, Aug. 1951, p. 695-698, 701-702.

Previously abstracted from *Journal of the Institute of Metals.* (Item 79-F, 1951). (F28, Cu)

224-F. The Extrusion of Aluminum Alloys. Christopher Smith. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys," 1951, p. 29-51; disc., p. 181-193.

Previously abstracted from *Journal of the Institute of Metals.* See item 57-F, 1950. (F24, Q24, Al)

225-F. The Hot Forging and Hot Stamping of Aluminum and Its Alloys. F. E. Stokeld. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys," 1951, p. 53-72; disc., p. 181-193.

Previously abstracted from *Journal of the Institute of Metals.* See item 58-F, 1950. (F22, G3, Q23, Al)

226-F. The Hot Working of Magnesium and Its Alloys. R. G. Wilkinson and F. A. Fox. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys," 1951, p. 73-100; disc., p. 181-193.

Previously abstracted from *Journal of the Institute of Metals.* See item 59-F, 1950. (F22, F23, F24, Mg)

227-F. The Hot Working of Copper and Copper Alloys. Maurice Cook and Edwin Davis. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys," 1951, p. 101-126; disc., p. 193-208.

Previously abstracted from *Journal of the Institute of Metals.* See item 60-F, 1950. (F general, Q23, Cu)

228-F. The Hot Working of Tin Bronzes. D. W. Dugard Showell. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys," 1951, p. 127-140; disc., p. 193-208.

Previously abstracted from *Journal of the Institute of Metals.* See item 61-F, 1950. (F general, Q23, Cu)

229-F. The Hot Working of Lead and Lead-Rich Alloys. L. H. Back. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys." 1951, p. 141-156; disc., p. 193-208.

Previously abstracted from *Journal of the Institute of Metals.* See item 62-F, 1950. (F24, Pb)

230-F. The Rolling of Zinc and Zinc-Rich Alloys. C. W. Roberts and B. Walters. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys." 1951, p. 157-180; disc., p. 193-208.

Previously abstracted from *Journal of the Institute of Metals.* See item 63-F, 1950. (F23, Q general, Zn)

231-F. The Hot Rolling of Aluminium and its Alloys. F. Kasz and P. C. Varley. *Institute of Metals,* "The Hot Working of Non-Ferrous Metals and Alloys," 1951, p. 7-28; disc., 181-193.

Previously abstracted from *Journal of the Institute of Metals.* See item 56-F, 1950. (F23, Al)

232-F. Washington Steel Corporation's 39-In. Cold Mill. T. S. Fitch. *Iron and Steel Engineer,* v. 28, Aug. 1951, p. 51-56; disc., p. 56-57.

Sendzimir mill and its operation. Application to rolling any metal thinner than 0.020 in. (F23)

233-F. Investigtions Into the Effect of Non-Metallic Inclusions on the Hot-Workability of Steel. R. Rapatz and M. Strobich. *Journal of the Iron and Steel Institute,* v. 168, Aug. 1951, p. 374-375.

Forging tests on mixtures of Fe powder with various proportions of the nonmetallic inclusions CaO, SiO_2, CaF_2, Na_2CO_3 and Na_2SiO_3. The lower the melting point of the included material, the greater is the difficulty in hot working, irrespective of whether the inclusions are acid or basic. The poor forgeability of steel containing acid inclusions is attributed to the low melting points of the silicates in the added material. Bars prepared from steel powder by hot working have almost the same mechanical properties as those prepared by casting and rolling. 10 ref. (F22, Q23, ST)

234-F. A Gas Cutting Machine for Hot Cropping of Blooms. W. S. Walker and A. C. Gerrard. *Journal of the Iron and Steel Institute,* v. 168, Aug. 1951, p. 401-406.

An oxygen cutter used to replace hot bloom shears for cropping has two cutters and two sets of control equipment. It is designed to cut alloy steels up to 30 in. thick at oxygen pressures of 20-35 psi. The cutting speed can be varied from 4 to 40 in. per min. and one complete operation for a 6¾ x 7-in. alloy bloom takes less than 45 sec. It can also be adapted for stainless-steel cutting. (F29, G22, SS, AY)

235-F. Die and Tool Steels for the Drop Forging Industry. H. J. Merchant. *Metal Treatment and Drop Forging*, v. 18, Aug. 1951, p. 369-376, 379.

The requirements, selection, and use of die and toolsteels for horizontal upsetter and vertical press forging practice, including roll-forging dies, hammer-die inserts, and steels for the auxiliary operations of trimming and punching. (To be continued.) (F22, T5, TS)

236-F. Quantity Production of Forgings. *Overseas Engineer*, v. 24, March, 1951, p. 184-186.

Rapid fabrication method of forged parts employed by the John Garrington and Sons, Ltd. of England. (F22, ST)

237-F. Tube Production for World Markets. *Overseas Engineer*, v. 25, Aug. 1951, p. 22-24.

Equipment and procedures of British firm engaged in production of miscellaneous large and small tubing or pipe of the cold-drawn seamless type. (F26, ST)

238-F. Integral Finned Tubing for Heat Exchangers. Walter P. Hill. *Product Engineering*, v. 22, Sept. 1951, p. 140-142.

A rotary extrusion method developed to produce a finned tube having integral helical fins. After forming, the tubes are often coiled or bent and inserted in shells to produce small lightweight heat exchangers. Tubes are manufactured in solid Cu, Cu-base alloys, solid Al, and steel. (F24, F26, Cu, Al, ST)

239-F. Sub-Zero Temperatures Increase Stainless Steel Versatility. *Production Engineering & Management*, v. 28, Sept. 1951, p. 78.

Brief mention of work done by Dr. Ziegler of Crane Co. and P. H. Brace of Westinghouse Research Laboratories. The effects of rolling and drawing at subzero temperatures. A combination of preparatory heat treatment, subzero working, and subsequent high-temperature aging was tried. (F23, SS)

240-F. Hammer Techniques Advance; Speed Fabrication of Aircraft Exhaust Systems. *Steel*, v. 129, Sept. 3, 1951, p. 88-90.

New techniques for improved hammer practice. Drop hammers are about the only forming method which satisfactorily produces compound curves and sharp radii in the heavy gages of corrosion resistant steels and aluminum parts. (F22, SS, Al, SG-g)

241-F. High-Speed Heating and Forging. Herbert Chase. *Steel*, v. 129, Sept. 10, 1951, p. 96-98.

By using slot-type billet heaters fed from magazines, Dodge forge plant upsets ends on flat blanks at the rate of 1000 per hr. with two headers. Partly automatic setup speeds handling. (F21, ST)

242-F. Metal Preparation Extends Steel Cold Working Limits. *Steel Equipment & Maintenance News*, v. 4, Aug. 1951, p. 18.

Foscoat process developed by Pennsylvania Salt Mfg. Co. cleaning, pickling, and application of a new phosphate coating and specially developed lubricants. (F1, L12, L14, ST)

243-F. Tungsten Carbide Rolls Impart Mirror Finish on Steel or Alloy Strip. *Steel Equipment & Maintenance News*, v. 4, Aug. 1951, p. 19. (F23, T5, ST, C-n)

244-F. Heavy Forging Methods. J. C. Stevens. *Steel Processing*, v. 37, Aug. 1951, p. 375-380, 398-399.

Forging defects such as overlaps and forge allowance. Methods of producing hollow forgings. (F22)

245-F. Phosphate Lubricating Method to Aid Cold Extrusion, Deep Drawing. *Steel Processing*, v. 37, Aug. 1951, p. 391, 413.

A new metal treating chemical process which extends lubrication limits in the cold working of steel. Process consists of compatible cleaning, pickling, and application of a new phosphate coating and specially developed lubricants. (F1, ST)

246-F. The Use of the Salt Bath in Forging. Part I. Is It Feasible for Billet Heating? Howard E. Boyer. *Steel Processing*, v. 37, Aug. 1951, p. 393-397.

Evolution of salt-bath heating. Various types of salt baths and economic factors involved. (F21, J21, ST)

247-F. (Book) **The Blacksmithing Business.** (In Russian.) G. G. Kamenshikov. 312 pages. 1948. State Publishing House for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy. Moscow, U.S.S.R.

After a discussion of the technical revolution supposed to have accompanied the Communist revolution, the 5-year plan for producing 65,600 heavy trucks, 112,000 tractors, etc., in the period 1946 to 1950, is outlined. Covers the working of metals from a backyard blacksmithing operation on up to the handling of heavy steel-mill equipment. (F general)

248-F. (Book) **The Hot Working of Non-Ferrous Metals and Alloys.** 208 pages. 1951. Institute of Metals, 4 Grosvenor Gardens, London S. W. 1, England. (Institute of Metals, Monograph and Report Series No. 9) $2.50.

Consists of eight papers previously published in the Jan. 1950 issue of *Journal of the Institute of Metals* and abstracted individually in Vol. 7 for 1950 of the A.S.M. Review of Metal Literature.
(F general, G general, EG-a)

249-F. Columbia's Cold Reduced Steel Products. Lawrence S. Dahl. *Blast Furnace and Steel Plant,* Sept. 1951, v. 39, p. 1084-1090.

Over-all operations of Columbia Steel Co.'s sheet and tin mill at Pittsburg, Calif., the only cold reduction mill of its kind in the western states. (F23, ST)

250-F. Centreless Bar Turners and Billet Peelers. W. Reichel. *Engineers' Digest,* v. 12, Sept. 1951, p. 301-304, 314. (Translated and condensed from *Stahl und Eisen,* v. 71, Feb. 15, 1951, p. 183-193.)

Investigates the peeling process. In contrast to cold-drawn shafting, peeled shafts were found to be free from internal stresses, grooves, and acid inclusions (no pickling is necessary), and there is no difference in strength between the surface and the core. (F29, ST)

251-F. Fundamentals of Forging and Forming. Hale A. Clark. *Industrial Gas,* v. 30, Sept. 1951, p. 13, 24-27, 29.

Preheating temperatures required; equipment, including hammers, upsetters and presses; batch type and continuous furnaces; and character and thickness of refractory materials. (F22, G1)

252-F. New Metal Treating Process Speeds Cold Working, Cold Extrusion of Steel. *Machine and Tool Blue Book,* v. 47, Oct. 1951, p. 153-154, 156, 158, 160.

A new metal treating chemical process greatly extends lubrication limits in the cold working of steel. It consists of compatible cleaning, pickling and application of a new phosphate coating and specially developed lubricants to steel. (F1, ST)

253-F. Brass and Bronze Forgings. Carl H. Phil. *Machinery Lloyd* (Overseas Ed.) v. 23, Sept. 1, 1951, p. 68-69, 71-72.

A survey. Applications in wartime production of irregularly shaped parts. (F22, Cu)

254-F. Die and Tool Steels for the Drop Forging Industry. (Concluded.) H. J. Merchant. *Metal Treatment and Drop Forging,* v. 18, Sept. 1951, p. 401-406.

Requirements of steels for roll forging dies, trimming presses and tools, trimming beds, and trimming punches. The treatment and care of forging plant is emphasized with some reference to surface treatment of dies to increase their life.
(F22, T5, TS)

255-F. Press-Forging Light Metals for Aircraft. Harry Wilkin Perry. *Modern Industrial Press,* v. 13, Sept. 1951, p. 28, 32, 34.

Using a 75,000-ton forging press, metals are squeezed under high pressure into dies by only a few press strokes instead of many repeated strokes of a drop hammer.
(F22, Al, Mg)

256-F. Some Principles of Continuous Wire Drawing. Clement Blazey and Vivian W. Benjamin. *Wire and Wire Products,* v. 26, Sept. 1951, p. 751-757, 798.

Information to assist both wire drawers and machine builders in their efforts to provide drawing conditions that are conducive to more efficient operation of equipment. The discussion is concerned with copper wire. (F28, Cu)

257-F. Cored Forgings Cut Production Costs. Miles J. Rowan. *American Machinist,* v. 95, Oct. 1951, p. 140-143.

Forgings cored without draft and accurate to ± 0.005 in. are now being produced regularly in brass and other nonferrous metals. Reductions in the weight of finished forgings run as high as 50% and subsequent machining is eliminated, or reduced to light finishing cuts.
(F22, Cu, EG-a)

258-F. Nodular Iron Hot-Forged and Rolled Experimentally. J. A. Perry and J. E. Rehder. *Iron Age,* v. 168, Oct. 4, 1951, p. 229-233.

Tests show that higher rolling temperatures and increased reduction improve mechanical properties. Edge cracking was a problem, holding the yield on width to 80%.
(F22, F23, Q general, CI)

259-F. Experiences With the Escher Metallic Recuperator on High-Temperature Furnaces. H. Escher. *Journal of the Iron and Steel Institute,* v. 169, Sept. 1951, p. 39-46.

Describes the above. Performance figures are given for a 10-in. mill billet-heating furnace, equipped with recuperators. Heating characteristics of coke-oven gas and blast-furnace gas as fuel for firing are compared. It is shown that thicker stock can be more satisfactorily heated in a single zone by using blast-furnace gas firing rather than coke-oven gas. A design is proposed for a single-zone blast-furnace-gas-fired furnace.
(F21)

260-F. Forging Munition Shells. W. Trinks. *Mechanical Engineering,* v. 73, Oct. 1951, p. 803-808, 817.

A review of two reports prepared by ASME on forging of steel shells. Steps required for making shell forgings from 75 to 240 mm.
(F22, T2, ST)

261-F. Experience Growing in Forming, Machining Titanium Alloys. James McElgin. *Steel,* v. 129, Oct. 1, 1951, p. 68-69, 94.

Forging, forming, drawing and machining of Ti. Recommended practices for annealing and stress relieving.

(F22, G general, J23, J1, Ti)

262-F. Precision Forging to ".010" Tolerance. J. W. Sheehan. *Western Machinery and Steel World,* v. 42, Sept. 1951, p. 74-76.

Techniques in design and operation in production of close-tolerance forgings. (F22)

263-F. Metals for the West; A Modernized Merchant Mill. Ralph G. Paul. *Western Machinery and Steel World,* v. 42, Sept. 1951, p. 84-86.

A merchant mill that produces a wide variety of sizes and shapes of hot-rolled products. (F23, ST)

264-F. Unique Process for Aluminum Tube Extrusion Developed by AiResearch. A. L. Marinke. *Western Metals,* v. 9, Sept. 1951, p. 27-29.

Production of tubes for use in heat exchangers. Steps in the extrusion process. (F26, Al)

265-F. Viewpoints on Design and Operation of City-Gas-Fired Die-Forging Furnaces. (In German.) Ernst Maase. *Gas-und Wasserfach,* v. 92, Aug. 15, 1951, p. 193-196.

Problems of design of continuous heating furnaces, from the standpoint of optimum efficiency, and the problem of scaling. (F22)

266-F. Non-Metallic Inclusions. F. Rapatz and M. Strobich. *Iron and Steel,* v. 24, Oct. 1951, p. 463-464.

Results of investigations indicate the nature and quantity of inclusions that a steel can tolerate without prejudice to its hot workability. No final conclusions are drawn.

(F general, D9, M28, ST)

267-F. Estimating Time Required for Forging Operations. M. H. Wiegandt. *Machinery* (American), v. 58, Oct. 1951, p. 188-191.

Estimating time calls for careful analysis of forging operation sequence and determination of the time required for each stage in any given forging job. The determination must be based on observation over a period of time, in order to arrive at an average figure. (F22)

268-F. Tensile Strength of Warm-Worked Austenitic Steel. *Metal Progress,* v. 60, Oct. 1951, p. 166, 168, 170. Condensed from "Effect of Warm-Working on an Austenitic Steel (G18B), " G. T. Harris and W. H. Bailey.

Previously abstracted from *Iron and Steel Institute,* "Symposium on High Temperature Steels and Alloys for Gas Turbines". See item 210-F, 1951. (F general, Q27, T25, SS)

269-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. (Continued). N. H. Polakowski. *Sheet Metal Industries,* v. 28, Oct. 1951, p. 885-898.

Analyzes the spreading during rolling, the resistance of metals to deformation and gives a distinction between the yield stress curve and the curve of minimum resistance to compression. Graphs. (To be continued). (F23, Q24)

270-F. The Production of Non-Ferrous Sheet and Strip at the Works of J. F. Ratcliff, (Metals) Ltd. *Sheet Metal Industries,* v. 28, Oct. 1951, p. 901-903.

Operations include annealing, rolling, casting, and finishing.

(F23, J23, EG-a)

271-F. Faster Mill Speeds Increase Rolling Capacity. Dan Reebel. *Steel,* v. 129, Oct. 15, 1951, p. 88, 91-92, 94, 96, 98.

Rolling-mill delivery speeds have been increased from 25 to 40% during the last few years due mainly to use of new and improved motors and controls. Graphs and diagrams show new and old set-ups and comparative performances. (F23)

272-F. The Oldsmobile Forge Plant; A Study of Modern High-Production Forging. Part I. John C. McComb. *Steel Processing,* v. 37, Sept. 1951, p. 439-451, 467.

An introductory section plus sections on the hammer shop, the press and upset shop, heating for forging, die sinking, and quality control. (To be continued.) (F22)

273-F. Preformed Billets Aid Forgings Production. *Steel Processing,* v. 37, Sept. 1951, p. 452-453, 467.

How die-rolling crankshaft blanks cut number of operations in production of Pontiac crankshafts at Oldsmobile Forge Plant. The die-rolling process is a roll-die forging method which embodies the hot rolling technique. Unlike ordinary hot rolling methods where multiple passes are employed to reduce a billet to the desired section, die-rolling is limited to one stand and pass. (F22, ST)

274-F. Rolls and Rolling. Part XXIX. Tees. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 39, Oct. 1951, p. 1224-1234.

A series of diagrams shows design features of roll passes for tee sections. (F23)

275-F. Recent Experiences in Copper Wire Drawing. (Concluded.) W. Hodgkins. *Industrial Diamond Review,* v. 11, June 1951, p. 134-135.

Use of the Syncro B16 machine for reduction of Cu wire 0.064-0.044 in. in diam. to 0.012-0.0076 in. Includes cost data. (F28, Cu)

276-F. Fundamentals of the Working of Metals. Part XXVII. Continuous Forming Processes. George Sachs. *Modern Industrial Press,* v. 13, Oct. 1951, p. 20, 22.

Continuous wire and tube drawing, continuous rolling, and roll forming. Schematic diagrams. (F23, F26, F28, G11)

277-F. Wire Drawing by Means of Tandem Wire-Drawing Equipment. (In Polish.) M. Schneider. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 3, 1951, p. 233-240.

Theoretical, mathematical analysis clarified by diagrams. (F28)

278-F. Some Aspects of Soaking Pit Operation. F. H. Graham. *Iron and Steel Engineer,* v. 28, Oct. 1951, p. 78-84; disc., p. 84.

Points that may be helpful in obtaining good soaking-pit operation. The first step is good soaking-pit design for the particular situation. (F21, ST)

279-F. Some New Rolling Mills in the United Kingdom. The New 42-In. Slabbing Mill at Shotton. J. F. R. Jones, **New Blooming and Billet Mills at Normandy Park Steel Works of John Lysaght's Scunthorpe Works, Ltd.** J. A. Peacock, **Rod and Bar Mill at Guest Keen and Nettlefolds, Ltd., Cardiff.** G. A. Phipps. **Light Section Mill at Darlington and Simpson Rolling Mill Co., Ltd.** W. French. *Iron and Steel Engineer,* v. 28, Oct. 1951, p. 93-104.

Diagrams, illustrations and tables. (F23, ST)

280-F. Forging and Related Operations at the Buick Plant. Philip H. Flynn and William A. Koppi. *Metal Treatment and Drop Forging,* v. 18, Oct. 1951, p. 433-439.

Emphasis on variations from other U. S. plants. Steel compositions, metallurgical control, heat treatment, inspection, scale removal, pickling, and forging-die practice. (F22, A5, CN, AY)

281-F. Steel Warehouse Installs Cold Reduction Strip Mill. *Steel,* v. 129, Nov. 12, 1951, p. 90, 92.

The layout of Korhummel, Heffron & Preiss Steel Co. for pickling, rolling, annealing, and slitting flat rolled steel. (F23, ST)

282-F. Rapid Reversal Technique Application for Rolling Mills. J. Rabinow. *Steel,* v. 129, Nov. 12, 1951, p. 97-98.

A high-speed device that can be used in the rolling mill. (F23)

283-F. Increasing Drop Forging Die Life. Part VIII. "Rougher and Finisher". John Mueller. *Steel Processing,* v. 37, Oct. 1951, p. 509-510.

Final forging operations. (F22, ST)

284-F. Straight-Line Production of Pipe. *Welding Engineer,* v. 36, Nov. 1951, p. 48-50.

Roll forming and resistance welding of steel pipe at Kaiser Steel Corp.'s Fontana, Calif., mill. (F26, CN)

285-F. Intensive Cultivation of a Specialized Field Pays Off. James E. Lewis. *Western Metals,* v. 9, Oct. 1951, p. 28-30.

Growth of cold rolled steel strip production in California Cold Rolled Steel Corp. (F23, ST)

286-F. Ryan Improves Drop Hammer Methods by Adopting Ideas of the Men-on-the-Machines. *Western Metals,* v. 9, Oct. 1951, p. 34-35.

Various ideas adopted for improving methods in the drop-hammer department. (F22)

287-F. New Sheet Metal Rolling Mill of S. A. Metallurgique d'Esperence-Longdoz. (In French.) F. de Bassompierre. *L'Ossature Metallique,* v. 16, Oct. 1951, p. 466-472.

Belgian mill is said to be the first to manufacture broad rolled sheet steel in a continuous process on the European continent. (F23, ST)

288-F. Deformation Process, Effect of Calibration, and Cladding in the Rolling Mill in the Mannesmann Process. (In German.) Werner Scheurer, Paul Gruner, and Anton Pomp. *Stahl und Eisen,* v. 71, July 19, 1951, p. 760-768.

Reviews literature. Experiments were made to establish optimum conditions for making steel tubes by the Mannesmann process, both plain and those to which a corrosion resistant layer is applied to both inside and outside of the tubes, an intimate bond being achieved by a combination of pressure and temperature. (F26, L22, ST)

289-F. Effect of Die Contour on Stress Distribution and Critical Deformations in Wire Drawing. (In German.) Erich Siebel. *Stahl und Eisen,* v. 71, Aug. 2, 1951, p. 801-803; disc., p. 803-805.

Theoretical study to determine effect of the shape and area reductions on average tensile stress of low-carbon steel wire. An example explains required conditions for drawing. (F28, CN)

290-F. Drive Efficiency in Multiple-Bar Drawing. (In German.) Fritz Boehm. *Stahl und Eisen,* v. 71, Aug. 2, 1951, p. 817-826.

Measurements on the simultaneous drawing of 1-10 carbon-steel bars established an optimum drawing

rate and showed a considerable saving in energy with increasing number of bars. (F27, ST)

291-F. Keeping the Rolls Clean on Rolling Stands for Hot Rolling Thin Sheet Metal. (In German.) Wilhelm Kramer. *Stahl und Eisen,* v. 71, Aug. 16, 1951, p. 878-880.

Causes of iron deposits on rolls and devices designed to remove these deposits. (F23, ST)

292-F. AIA Looks to Future Use of Titanium. Alexander McSurely. *Aviation Week,* v. 55, Nov. 12, 1951, p. 34, 36, 40.

Manufacturing method projects recommended by Aircraft Industries Association for Air Materiel Command sponsorship. Miscellaneous primary and secondary fabrication processes and welding operations are included.
(F general, G general, K general, Ti)

293-F. Improved Producibility Through Extrusion. *Machine Design,* v. 23. Nov. 1951, p. 139-141.

Equipment and procedures of new mass-production method for hot extruding one-piece, hollow-steel propeller blades for high-speed combat and commercial aircraft. Strength-weight ratio and quality improvements accompany production-time savings. (F24, ST)

294-F. Cold Rolling of Steel Strip. (In Swedish.) Carl Sebardt. *Jernkontorets Annaler,* v. 135, No. 7, 1951, p. 287-384, disc., p. 384-402.

Both theoretical and practical aspects of cold rolling. General review of cold rolling as applied to strip as well as of different methods for practical calculations. Material properties in relation to degree of reduction and number of passes; also tolerances and surface defects. Furnace and other devices used in pickling, annealing, rolling, cutting, inspection, etc. Some economic questions and the position of cold rolling in Sweden.
(F23, J23, L12, S13, ST)

SECTION G

SECONDARY MECHANICAL WORKING

1-G. Save 43c Per Peening $ With Two New Shot Types. *SAE Journal,* v. 58, Dec. 1950, p. 30-33. Excerpts from "Some of the Economical Aspects of the New Types of Shot", by A. E. Proctor.

Glowing reports on the saving shown by the new peening shot types—cut wire and cast steel—over chilled iron shot led to production tests at Ford comparing the three types. Test results showed the two new shot types net a 43% saving compared with chilled iron shot. (G23, T5, ST, CI)

2-G. Dry Drawing. Richard F. Roy. *Better Enameling,* v. 21, Dec. 1950, p. 14-15, 30-31.

Development of dry powders suitable for use as drawing lubricants. Various methods of application and advantages. (G21)

3-G. Tracing Devices in Shape Flame Cutting. Raymond O. Fish. *Welding Journal,* v. 29, Dec. 1950, p. 1059-1064.

Principles of electronically guided template tracing devices, their preparation and application. (G22)

4-G. Hints for Cutting Thick Steel. O. J. Swan. *Welding Journal,* v. 29, Dec. 1950, p. 1103.

Refers to oxyacetylene cutting. Clarified by diagrams. (G22, ST)

5-G. Processing the Clad Steels. Rick Mansell. *Steel Processing,* v. 36, Dec. 1950, p. 605-611, 645.

Procedures for common types of clad steels. Includes shearing, punching, drilling, bending, drawing, welding, mechanical and flame cutting, heat treatment, finishing, and handling precautions for surface protection. (G general, CN, AY)

6-G. Machining Studies Aid Aero Production. *Aviation Week,* v. 53, Dec. 18, 1950, p. 22, 25-26, 28-29.

Results of Air Force research on high-temperature alloy machining, published in a recent book by Curtiss-Wright Corp. Various phases were worked on by Curtiss-Wright, Ford Motor Co., Metcut Research Associates, and Massachusetts Institute of Technology. (G17, SG-h)

7-G. Free Machining Copper-Rich Alloys. P. Mabb. *Metal Treatment and Drop Forging,* v. 17, Autumn 1950, p. 154-160.

Methods of obtaining satisfactory machinability in brasses, bronzes, and nickel silvers. Effects of Pb, Te, and Se additions, and properties of alloys containing these elements. (G17, Cu, SG-k)

8-G. Metallurgy of Oxygen Cutting Using an Electric Arc. (In French.) F. Danhier. *Soudure et Techniques Connexes,* v. 4, Sept.-Oct. 1950, p. 197-200, disc., p. 200-201.

A combined process in which both the electric arc and a jet of oxygen issuing from the end of a hollow electrode are used. Metallurgical behavior of common metals and alloys, such as Fe, low-alloy steel, Al, Ni, stainless steel, Cu, cast iron, Zn, and Mg, during this type of cutting. (G22, Fe, ST, Al, Ni, Cu, Zn, Mg)

9-G. The Electrical Cutting of Hard Metal and Steel. (In German.) T. P. Rekshinskaya. *Schweisstechnik,* v. 4, Sept. 1950, p. 101-103. (Translated from the Russian.)

Electrical "erosion" process, in which the metal is cut by the action of sparks between a cutting disc and the metal to be cut, the metal being protected against heating by a cooling liquid. (G17, ST, C-n)

10-G. Stresses in Material Caused by Deep Drawing; Their Effect on the Design of Dies and Upon Choice of Material. (In German.) K. Ziegler. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.,* v. 27, July-Aug. 1950, p. 248-257.

Principles of deep drawing, its effect on the sheet metal, and properties and conditions required of material to be drawn; also die design. (G4)

11-G. Practical Considerations With Respect to the Use of Cemented and Sintered Carbides in the Machining of Materials. (In Italian.) Carlo Alfredo Bertella. *Metallurgia Italiana,* v. 42, Aug.-Sept. 1950, p. 299-304.

Structure and characteristics of sintered carbides for tools. Diagrams show methods of fastening to tool holders. Methods of grinding and use. (G17, T6. C-n)

12-G. First-Aid for Ten Cutting-Die Troubles. Federico Strasser. *American Machinist,* v. 94, Dec. 25, 1950, p. 96-98.

Text and diagrams give remedies. (G2)

13-G. Air Force Curtiss-Wright Report Machinability Data for High-Temperature Alloys. Rupert Le Grand. *American Machinist,* v. 94, Dec. 25, 1950, p. 99-106.

Portion of the results of a $100,000 machinability-research project handled for the Air Force. (G17, SG-h)

14-G. Tube Coiling. Small Coils for Heat Exchangers. Jack Miller. **Large Coils for Fireboxes.** William C. Keeran. *American Machinist,* v. 94, Dec. 25, 1950, p. 107-109.

Equipment and procedures of Vapor Heating Corp. (G6)

15-G. Power Spinning Eliminates Annealing and Descaling. L. W. Court. *American Machinist,* v. 94, Dec. 25, 1950, p. 114-115.

How stainless-steel bowls for cream separators are spun on a new, power-operated machine. Annealing and descaling, required for press operation, are eliminated and polishing time is reduced. (G13, SS)

16-G. Continuous Filings as Applied to Castings. H. J. Chamberland. *American Foundryman,* v. 18, Dec. 1950, p. 37-40.

New production technique and its applications to castings. (G17)

17-G. How to Cut Steel. *Linde Tips and Oxy-Acetylene Tips,* v. 30, Jan. 1951, p. 5-7.

Recommended oxy-acetylene cutting procedures. (G22, ST)

18-G. Straight-line Appliance Production. Gilbert C. Close. *Finish,* v. 8, Jan. 1951, p. 23-26, 66.

Equipment and procedures used in production of water heaters. Includes forming, galvanizing, and electrostatic spray-painting operations. (G1, L16, L26, CN)

19-G. Stretch-Wrap Forming; Principles and Application of the Hufford Machine. Part I. Tooling Methods and Typical Examples of Forming Procedure From U. S. Practice. Part II. British Practice in the Use of the Hufford Machine. *Aircraft Production,* v. 12, Nov. 1950, p. 317-326; Dec. 1950, p. 334-340. (G9)

20-G. Comparative Testing of Cutting Tools for Rapid Cutting. (In Russian.) P. N. Pobegalov. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Sept. 1950, p. 30-31.

Results for different cutting-tool shapes as applied to hardened steels. (G17, ST)

21-G. Influence of Lubricants During Cutting of Metals. (In Russian.) *Vestnik Akademii Nauk USSR* (News of the Academy of Sciences of the USSR), Sept. 1950, p. 105-106.

Reviews the work of N. P. Zhadin described in his dissertation "Influence of Surface-Active Liquids on Thermal Effects of Cutting of Metals". When large axial loads are applied to the drill, the dependence of specific heat of cutting of metals on concentration of surface-active substances in the lubricant has a marked adsorption character. Existence of the phenomenon of inversion—i.e., transfer of the cutting action of the active liquid to the lubricant during decrease of pressure on the cutting tool—is confirmed. (G21)

22-G. Superfinishing Crankshaft Bearings of Marine Engines. (In Japanese.) Atsushi Inoue. *Journal of Mechanical Laboratory,* v. 4, Mar. 1950 p. 54-61.

Experiences and data charted. Material was mild steel. (G19, CN)

23-G. Band Saws Can Cut Blank Costs. H. J. Chamberland. *American Machinist,* v. 95, Jan. 8, 1951, p. 108-109.

Contoured blanks, even in lots as large as 5000 pieces, may be produced at lower cost by band machining than by the cheapest press tools. (G17)

24-G. New Punch Does Better Job, Slashes Cost. J. R. Reinertson. *Iron Age,* v. 167, Jan. 11, 1951, p. 55-58.

New type of punch, straight-ground and with a soft metal sleeve to absorb vibration, which produces holes with straight walls and no burr to replace drilled and reamed holes. It can make holes in stock thicker than the hole diameter. Pieces per grind have been increased 700% in some cases, and die maintenance cut 80%. (G2)

25-G. Cold-Extruded Shells for the Field Artillery. Ben Kaul. *Machinery* (American), v. 57, Jan. 1951, p. 158-163.

How improved quality, high-strength artillery shells can now be produced from ordinary low-carbon steel by the cold-extrusion process. Substantial savings of steel are achieved, and highly uniform, more accurate shells result. (G5, T2, CN)

26-G. Inexpensive Blanking Punch and Die. P. D'Agostine. *Machinery* (American), v. 57, Jan. 1951, p. 192-194.

The method makes it possible to produce blanks on a standard punch press at a relatively low initial die cost. (G2)

27-G. One Draw Reduces 40-In. Diameter Blank 66 PCT. George Elwers. *Iron Age*, v. 167, Jan. 18, 1951, p. 55-58.

Steel blanks nearly 40 in. in diam. are being reduced approximately 66% to cups with a length-diameter ratio of nearly 1.7:1 in a single press stroke in drawing operations at Scaife Co., Pittsburgh. The method used is reverse drawing, in which the press transforms a blank into a shallow cup, then literally turns the cup inside out as it continues the draw, all in one continuous stroke. The process has also been applied experimentally to other metals. (G4, CN)

28-G. Fundamentals of the Working of Metals. Part 18. George Sachs. *Modern Industrial Press*, v. 12, Dec. 1950, p. 6, 8, 34, 38.

General considerations in bending, strains in bending, minimum bend radii, and springback. (G6)

29-G. Simplified Production of Steel Light Poles. Howard E. Jackson. *Modern Industrial Press*, v. 12, Dec. 1950, p. 13-14, 16, 18, 20.

Miscellaneous press operations and welding in production of poles for street lights by Pacific Car and Foundry Co., Renton, Wash. (G1, K general, T1, CN)

30-G. Intricate Electrical Instruments Produced at Sangamo Electric. Walter Rudolph. *Modern Industrial Press*, v. 12, Dec. 1950, p. 22, 24, 26, 30, 32.

Miscellaneous press operations, spot welding, and machining in production of the above. Materials include sheet Al, steel, and brass. (G1, G17, K3, T8, Al, ST, Cu)

31-G. Fabricating Aluminum Barrels. Hugh Jarman. *Light Metal Age*, v. 8, Dec. 1950, p. 6-7, 20.

Equipment and procedures for production of over 1200 15½-gal. beer barrels per day. Operations include deep drawing, welding, heat treatment, and finishing. (G4, A5, Al)

32-G. Contour Forming Technique Spreads. *Light Metal Age*, v. 8, Dec. 1950, p. 11.

How bus and coach manufacturers are employing machinery and methods designed for aircraft fabrication in Al forming. (G9, Al)

33-G. Spun Neutral Shapes Facilitate Drop Hammer Forming. Gilbert C. Close. *Steel*, v. 128, Jan. 22, 1951, p. 72-74.

By spinning flat metal sheets into neutral shapes prior to forming, Douglas Aircraft eliminates several sets of expensive multiple staging dies. Metal thickness and distribution can be closely controlled, thus minimizing excessive local thinning and rupture during final hammer forming. Materials are largely various Al alloys. (G13, F22, Al)

34-G. Application of Metal Cutting Research to Shop Practice. Part I. Max Kronenberg. *Modern Machine Shop*, v. 23, Jan. 1951, p. 74-78, 80, 82-83.

Construction of productivity charts to convey basic conclusions of metal cutting research to the tool engineer and to management. Typical charts and their use, illustrated by numerical examples. (To be continued.) (G17)

35-G. Advantageous Coordination of Metal Forming and Cleaning Operations. G. A. Cairns. *Better Enameling*, v. 22, Jan. 1951, p. 18-19, 29, 31.

Recommended drawing compounds on the basis of the subsequent cleaning and finishing operation. Importance of considering the latter operations when selecting the lubricant to be used in the forming shop. Concerned only with steel. (G21, L12, ST)

36-G. Machinability and Metal Cutting. Francis W. Boulger. *Canadian Metals*, v. 13, Dec. 1950, p. 6-9, 46, 51.

Factors conducive to better machinability, with major attention to machine set-up, tool design, and cutting of alloys. The machining properties of Al, Mg, Cu, and stainless steel. 19 ref. (G17, Al, Mg, Cu, SS)

37-G. The "Cinox" Oxygen-Cutting Process. (In French.) G. Ancion and T. Courard. *Zeitschrift für Schweisstechnik; Journal de la Soudure*, v. 40, Dec. 1950, p. 211-216.

Process for cutting stainless steels, including diagrams of the cutting tip and photomicrographs. The viscous Cr oxide slag first formed is penetrated by a blast of specially treated quartz sand. (G22)

38-G. The Machinability of 12-14% Mn Steel. (In German.) C. Herrmann. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 92, Dec. 11, 1950, p. 988.

Investigation of three steels containing 1.14, 1.26, and 1.38% C shows that machinability is practically a linear function of carbon content. (G17, AY)

39-G. Electric-Arc Sharpening and Finishing of Hard-Alloy Cutting Tips. (In Russian.) M. N. Ulitin. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Oct. 1950, p. 3-6.

Basic characteristics of the method. Factors influencing rate of production and quality of surface obtained. Technical-economic indexes compare electric-arc grinding with abrasive grinding. Advantages. (G18, SG-j)

40-G. (Book) Die Design and Diemaking Practice. Ed. 3, Franklin D. Jones, editor. Industrial Press, 148 Lafayette St., New York 13, N. Y. $7.00.

Extensively revised; five new chapters added, the cross-index expanded, and a detailed table of contents provided. The new chapters cover materials used in diemaking; use of rubber in conjunction with press tools; pointers on design of stampings; heat treatment of die steel; and designing dies for powdered-metal parts. (G general, T5)

41-G. (Book) The Machining of Copper and Its Alloys. Ed. 3. 116 pages. 1950. Copper Development Assn., Kendals Hall, Radlett, Hertfordshire, England. (Publication No. 34.) (Gratis.)

Machining properties of Cu alloys and modern machining practice. The present edition contains no major alterations. (G17, Cu)

42-G. Machining and Hardening in the Same Setup. Joseph Geschelin. *Automotive Industries,* v. 104, Jan. 15, 1951, p. 50, 128.

Experimental setup for producing universal-joint bearing races and flanged bearing races on eight-spindle Conomatics. It is fitted with an induction hardening attachment, making possible not only the machining of these parts directly from bar stock but selective hardening as well in the same cycle. (G17, J26, ST)

43-G. Metal Working Tools For High Production. S. K. Rudorf. *Metal Progress,* v. 59, Jan. 1951, p. 80-85.

Practical discussion of past developments and future prospects in tool materials, design, and other factors in increasing metal-cutting production, and in machining of very hard materials. (G17, T6)

44-G. For Best Enameling Results Coordinate Cleaner Drawing Compound. G. A. Cairns. *Ceramic Industry,* v. 56, Feb. 1951, p. 47, 49.

See abstract of "Advantageous Coordination of Metal Forming and Cleaning Operations," *Better Enameling,* item 35-G, 1951. (G21, L12, ST)

45-G. The Design and Manufacture of Woven Wire Fence. Julian L. Schueler. *Wire and Wire Products,* v. 26, Jan. 1951, p. 29, 31-39, 79-80.

Types of fences; types of wire used; weaving machines and methods. 29 ref. (G6, T10, ST)

46-G. Effect of Fluids on Tool Tip Temperatures. Joseph D. Pigott and Leonard P. Richardson. *Tool Engineer,* v. 26, Jan. 1951, p. 35-37.

Apparatus for determination of tool tip temperatures. Results of tests made on a Monarch lathe, using SAE 1015 plug-pierced seamless tubing as workpieces and 18-4-1 high speed steel for tools. (G17, CN, TS)

47-G. Experience With Machinability Repeat-Ability. E. J. R. Hudec. *Transactions of the American Society of Mechanical Engineers,* v. 73, Jan. 1951, p. 17-19, disc., p. 19-20.

Experiences with certain phases of the machinability problem, and a means by which repeat test runs can be made to give more consistent results. (G17)

48-G. A Study of Heat Developed in Cylindrical Grinding. R. E. McKee, R. S. Moore, and O. W. Boston. *Transactions of the American Society of Mechanical Engineers,* v. 73, Jan. 1951, p. 21-33, disc., p. 33-34.

Fourth of a series on cylindrical grinding. Results of an investigation of the grinding process with particular reference to the influence of grain size of a grinding wheel and type of grinding compound on volume of metal removed per unit of wheel wear, unit net horsepower, surface finish, grinding rating, temperature increase in the workpiece surface, temperature increase in the grinding compound, and possible injury to structure of the metal. Specimens were SAE 52100 steel, subjected to a definite preliminary heat treatment schedule. (G18, AY)

49-G. Machining of Heated Metals. E. T. Armstrong, A. S. Cosler, Jr., and E. F. Katz. *Transactions of the American Society of Mechanical Engineers,* v. 73, Jan. 1951, p. 35-42, disc., p. 42-43.

Previously abstracted from *American Society of Mechanical Engineers,* Paper 50-S-5, 1950. See item 288-G, 1950. (G17, AY, SS, TS, Co)

50-G. The Effect of the Cutting Fluid Upon Chip-Tool Interface Temperature. M. C. Shaw, J. D. Pigott,

and L. P. Richardson. *Transactions of the American Society of Mechanical Engineers,* v. 73, Jan. 1951, p. 45-52, disc., p. 52-56.

Analyzes the short-circuiting effect of a cutting fluid in conjunction with chip-tool interface temperature measurements by the tool-work thermocouple technique. An experimental arrangement based upon results of this analysis is capable of giving reliable cutting temperatures in the presence of fluids. Representative water-base cutting fluids become less effective in reducing cutting temperature as volume of metal removed per unit time is increased. Workpiece material was SAE 1015 plug-pierced seamless tubing. Tool material was 18-4-1 high-speed toolsteel. 11 ref. (G17, CN, TS)

51-G. An Analytical Evaluation of Metal-Cutting Temperatures. K. J. Trigger and B. T. Chao. *Transactions of the American Society of Mechanical Engineers,* v. 73, Jan. 1951, p. 57-66, disc., p. 66-68.

Average tool-chip interface temperature is calculated by considering the mechanism of heat generation during metal-cutting operations in which a "type 2" chip is formed. Analytical results agree well with those obtained experimentally. 18 ref. (G17)

52-G. Discussion on Presswork Production; An Examination of the Technique of Using Progressive Tools. R. Kirchner and G. V. Bevan. *Sheet Metal Industries,* v. 28, Jan. 1951, p. 41-42, disc., p. 42-50, 55.

Author's introduction plus extensive discussion. (G1)

53-G. Tools for the Job. *Aeroplane,* v. 80, Jan. 5, 1951, p. 13-17.

Two recent developments in aircraft manufacturing—spin-dimpling and squeeze-riveting. (G2, K13, Al)

54-G. Hot Pressing of Brasses. R. W. N. Danielson. *Metal Industry,* v. 77, Dec. 29, 1950, p. 315-318.

The process and some of its applications. Compositions suitable for the process and for different uses. Types of dies used and die sinking operations. (G1, G16, Cu)

55-G. Fundamentals of the Working of Metals. Part 19. George Sachs. *Modern Industrial Press,* v. 13, Jan. 1951, p. 6, 8, 55.

Classification of shearing methods and distortion-caused defects during shearing. (G15)

56-G. Hot Machining of Many Metals Improved by Arc Heating. E. T. Armstrong and A. S. Cosler. *Materials & Methods,* v. 33, Jan. 1951, p. 69-73.

Metal cutting at elevated temperatures using arc heating has resulted in improved machinability, longer tool life, and the machining of metals previously difficult to machine. (G17)

57-G. Application of Metal Cutting Research to Shop Practice. Part II. Max Kronenberg. *Modern Machine Shop,* v. 23, Feb. 1951, p. 100-104, 106, 108, 110.

Practical methods for determining proper machining feeds and speeds. (G17)

58-G. Steam Coil Fabrication Combines Latest Forming, Welding Methods. Dan Reebel. *Steel,* v. 128, Feb. 5, 1951, p. 76-78.

Equipment and procedures used to fabricate steam coils for steam-generating plants used to heat diesel-powered passenger trains. Tubing is made of ASME A-83 seamless steel tubing. (G general, K2, T27, ST)

59-G. Mass Production. Component and Circuit Die Stamping. Ralph G. Peters. *Tele-Vision Engineering,* v. 2, Jan. 1951, p. 10-11, 23-25.

Die stamping of circuit wiring and a variety of components out of sheets of conducting materials, which are simultaneously attached to a sheet of insulating material. The method overcomes limitations of hand procedures in assembly, wiring, soldering, and testing. It was found to minimize maintenance of completed units and to provide assurance of peak performance. (G3)

60-G. Grinding Fluids; Characteristics and Applications. H. W. Wagner. *Mechanical Engineering,* v. 73, Feb. 1951, p. 128-132.

Classifies fluids with reference to composition. Positive and negative functions of fluids; types of fluids rated with regard to ability to fulfill the functions. A theory of the benefit of lubrication to grinding; correlated with lubrication from the fluid with surface finish on the work. Data from experimental grinding. (G18, G21)

61-G. Automatic Flame Gouging. *Industry & Welding,* v. 24, Feb. 1951, p. 56, 69.

Specially designed nozzles, a double torch, and ordinary turning rolls, have mechanized some applications to provide efficient automatic gouging at M. W. Kellogg Co., Jersey City, N. J. (G22, CN)

62-G. From Bolts to Nuts. Richard Cheney. *Steelways,* v. 7, Jan. 1951, p. 20-22.

Story of their production. (G2, G10)

63-G. Edge Preparation for Welding. C. A. Heffernon. *Canadian Metals,* v. 14, Jan. 1951, p. 32-34, 36.

Modern production welding requires various types of edge preparation. To carry out this operation rapidly and economically, ingenious mountings for oxygen-cutting equipment have been devised. Describes examples applied to mass-production in Canada and the U. S. (G22, K general)

64-G. Spin-Dimpling. *Aircraft Production,* v. 13, Jan. 1951, p. 3-7.

New cold process for producing a close-tolerance countersunk form for flush riveting developed by Bristol Aeroplane Co., Ltd., in Britain. (G2)

65-G. Shearing of Metal Bars. T. M. Chang and H. W. Swift. *Journal of the Institute of Metals,* v. 78, Oct. 1950, p. 119-146.

Stresses, metal flow, and crack propagation in the shearing of ½-in. thick bars of most industrial metals were studied. It was found that there are two chief modes of fracture in shearing without clearance, differing for ductile and other materials. Clearances up to 30% of the metal thickness were investigated. Effects of dullness of cutting edge and of tensile overstrain were also studied. 10 ref. (G15, Q26)

66-G. Problems of Metal-Cutting Research. (In German.) E. Brödner. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Dec. 21, 1950, p. 1021-1025.

Reviews literature on the theory of metal cutting and the relationships between metal properties and structures, machine-tools used, cutting speeds, etc. 69 ref. (G17)

67-G. Electromechanical Method of Cutting Metal During Fine Machining. (In Russian.) B. M. Askinazi. *Promyshlennaya Energetika* (Industrial Power), v. 7, Oct. 1950, p. 9-10.

Method is based on simultaneous utilization of two sources of heat: that formed by deformation and friction during removal of chips; and auxiliary heat supplied by an electric current to the zone of cutting. Addition of internal cooling to the cutting wheel is also recommended. Schematic diagrams illustrate details of equipment. Optimum conditions of operation. (G17)

68-G. Preparation of Edges of Sheet Steel for Welding by Means of Gas Cutting. (In Russian.) A. K. Krzhechkovskii. *Avtogennoe Delo* (Welding), v. 21, Oct. 1950, p. 27-30.

Problem was investigated to establish basic procedures and production setups and to determine optimum conditions of cutting low-alloy steel 10-100 mm. thick. Both V-shaped and X-shaped sheet edges were investigated. (G22, K2, CN)

69-G. Influence of Preliminary Cold Working of Aluminum on Effectiveness of Surface-Active Liquids Applied During Cutting. (In Russian.) G. I. Epifanov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Dec. 1, 1950, p. 555-557.

Investigated on commercial Al annealed at 400° C for 1 hr., slowly cooled, then cold rolled, using butyl alcohol as the surface-active liquid. Data indicate that during cutting of metals having different plasticities, or of individual metals with different degrees of plasticity induced by cold working, effectiveness of surface-active liquids decreases during transition to more brittle metals or brittle states of the same metal. (G21, A1)

70-G. Stepped Diameter Parts Extruded to Close Tolerances. *Automotive Industries,* v. 104, Feb. 15, 1951, p. 50, 104.

Extrusion of parts such as transmission shafts, studs, and other formed automotive parts from steel bars and slugs has been a specialty of Molloy Mfg. Co., Detroit. The technique appears to be applicable to many similar parts for military requirements. (G5, ST)

71-G. Die Life Can Be Increased. F. J. Henkel. *Production Engineering & Management,* v. 27, Feb. 1951, p. 66-69.

Procedures for the manufacture and servicing of dies, which will provide greater die life by increasing and equalizing the number of hits obtainable between grinds. Analysis is based on physical tests and research carried on over a period of several years. (G1)

72-G. Streamlined Production: Tailor-Made Products Mass Produced. *Production Engineering & Management,* v. 27, Feb. 1951, p. 71-78.

Procedures and equipment for production of complex nameplates and insignia. Al and its alloys are used for 90% of the items, although ferrous and other nonferrous alloys are also worked. Forming, finishing, and welding are the principal procedures. (G3, K general, L general, T9, Al)

73-G. Special Nail is Formed and Upset Rapidly. E. A. Eliason. *Wire and Wire Products,* v. 26, Feb. 1951, p. 135-136.

Operations used in forming special nails. Eight operations performed in

rapid sequence include notching the wire and formation of a half head on each end. (G10, CN)

74-G. An Investigation of the Flow and Effect of a Cutting Oil in Machining Operations. W. E. Lauterbach and E. A. Ratzel. *Lubricatiou Engineering,* v. 7, Feb. 1951, p. 15-19.

Investigation on certain cutting operations conducted at surface speeds between 2½ and 200 ft. per min. For very low cutting speeds (below approximately 10 ft. per min. for the particular cutting conditions employed), the cutting oil penetrates between the tool and workpiece and between the tool and chip, entering from the clearance crevice and not from the rake crevice. At higher cutting speeds penetration of the oil between tool and workpiece and between tool and chip from either crevice could not be detected by the method used. (G17, G21)

75-G. Machining the Stainless Steels. Lester F. Spencer. *Tool & Die Journal,* v. 16, Jan. 1951, p. 52-53, 61, 64, 68, 116; Feb. 1951, p. 70-71, 83.

Machining characteristics of the various types; recommended machining speeds. Machine tool setups for typical stainless steel parts. Feb. issue: hollow mills; box tools; knee tools; tool selection; grinds; finish; chip curlers; circular tools; forming tools; and swing tools. (To be continued.) (G17, SS)

76-G. Applications of Carbide Cutting Tools to Cost Reduction and High Production. J. R. Miller. *Tool & Die Journal,* v. 16, Feb. 1951, p. 74, 76, 78, 134.

(G17, T6, C-n)

77-G. West Coast Metalworking Progress in 1950. Thomas A. Dickinson. *Steel Processing,* v. 37, Jan. 1951, p. 20-22, 43, 49.

Processing equipment and developments installed by various firms. Includes stretch-wrap forming, machining, grinding, pipe production, welding, heat treating and others. (G general)

78-G. Oxygen Cutting Processes in Steel Foundries. R. S. Babcock. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 346-357; disc., p. 357-358.

Previously abstracted from preprint. See item 155-G, 1950. (G22, E24, CN, SS)

79-G. Bandsawing in Foundries. Geo. H. Sheppard. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 621-625.

(G17, E general)

80-G. Manipulation of Corrosion and Heat Resisting Steels. Techniques for Machining, Shearing and Pressing. J. A. McWilliam. *Welding & Metal Fabrication,* v. 19, Jan. 1951, p. 19-24.

(G17, G1, G15, SS, SG-g, h)

81-G. A. Review of Equipment Used in the Manufacture of Tin Boxes. G. Taylor. *Sheet Metal Industries,* v. 28, Jan. 1951, p. 35-38.

First of series covering sheet metals less than 0.015 in. Treadle-operated shears and gang slitting machines. (To be continued.) (G15)

82-G. Fabricating Large Steel Pipes. *Machinery* (London), v. 78, Jan. 18, 1951, p. 91-97.

Equipment and procedures of Basalt Rock Co., Napa, Calif. Operations include shearing, chemical cleaning and descaling, forming, and arc welding. (G15, G6, L12, K1, CN)

83-G. (Book) Hard Metals. E. Hirschfeld. 264 pages. Schweizer Druck- und Verlagshaus A. G., Zurich 8, Switzerland. 29s.

A comprehensive publication on machining with sintered carbide tools and the development and application of hard metals in general. First published in Czech. A survey of Continental practice with carbide tools. Contains an extensive bibliography as well as a name and subject index. 113 ref. (G17, T6, C-n)

84-G. High-Speed Machining of Forgings. Charles H. Wick. *Machinery* (American), v. 57, Feb. 1951, p. 147-151.

Cutting speeds as high as 1130 surface ft. per min. are being used by Ford Motor Co. in turning forged gear blanks. 2 lb. of metal is removed from one part in 12 sec. (G17, AY)

85-G. Cost-Cutting Methods of Producing "Henry J" Car Bodies. H. R. Smith. *Machinery* (American), v. 57, Feb. 1951, p. 167-173.

A new method of body die making involving use of cast plastic, a sharp reduction in number of stampings required per car, and increased use of automatic welding machines. (G16, G3, K1, T21, CN)

86-G. Preparing Plate Edges for Production Welding. C. A. Heffernon. *Machinery* (American), v. 57, Feb. 1951, p. 182-186.

Arrangements of oxyacetylene-torch cutting nozzles for edge preparation of sheet steel. (G22, ST)

87-G. Microstructure of Metals. Michael Field, Norman Zlatin, and John F. Kahles. *American Machinist,* v. 95, Jan. 22, 1951, p. 315, 317, 319; Feb. 5, 1951, p. 165, 167, 169. (Reprinted from "United States Air Force Machinability Report—1950", published by Curtiss-Wright Corp.)

Points out that machinability of metals is definitely related to microstructure. Illustrated description of the various phases encountered in steel and their effects on machinability. (G17, M27)

88-G. The Production of Tinplate Caps for Circular Lever-Lid Containers. J. W. Langton. *Sheet Metal Industries,* v. 28, Feb. 1951, p. 137-140, 146.

Clarified by diagrams. (G3, CN)

89-G. Discussion on Some Factors in the Design of Aluminium Assemblies With Particular Reference to Forming, Joining, and Finishing. *Sheet Metal Industries,* v. 28, Feb. 1951, p. 147-151.

Covers paper of above title by J. C. Bailey, presented at Autumn Conference, 1950, of the Sheet and Strip Metal Users' Technical Assn. (F general, G general, K general, L general, Al)

90-G. Cold-Forming Large Nuts at High Speed. J. B. Springer. *Machinery* (London), v. 78, Feb. 1, 1951, p. 186-188.

Equipment and procedures at Industrial Nut Corp., Sandusky, Ohio. (G2, T7, CN)

91-G. Semiautomatic Apparatus for Oxygen Cutting of "PL" Steel. (In Russian.) *Torfyanaya Promyshlennost* (Peat Industry), v. 27, Nov. 1950, p. 28-29.

A device having a cast Silumin body and capable of cutting steel of up to 100-mm. thick. Operating characteristics for various thicknesses are tabulated. (G22, ST)

92-G. Shop Tests Develop Efficient Machining. G. W. Halston. *American Machinist,* v. 95, Feb. 5, 1951, p. 121-124.

Test procedures and results obtained in the shop of De Laval Steam Turbine Co. on cast iron, cast steel, and bronze. Varying conditions from which the most economical combination of feed, speed, and depth of cut in relation to tool life can be found. (G17, CI, Cu)

93-G. Redesigned Freezer Door Uses Less Steel. J. V. Kielb. *Iron Age,* v. 167, Feb. 22, 1951, p. 67-70.

A unique home-freezer door design cuts materials costs by permitting use of lighter-gage steel, introduced knotty problems in drawing and porcelain enameling. How these were solved by refinements in design and processing methods. (G4, L27, CN)

94-G. Lead-Bearing Steel Improves Machinability. Henry J. Holquist. *Materials & Methods,* v. 33, Feb. 1951, p. 142, 144, 146.

Improved properties of "Ledloy", which contains 0.25% Pb in finely dispersed form. Machinability data. (G17, AY)

95-G. Fundamentals of the Working of Metals. Part XX. George Sachs. *Modern Industrial Press,* v. 13, Feb. 1951, p. 6, 8, 38.

Contour forming and bending; stresses in contour forming; difficulties in contour forming; stretching limits; and wrinkling, distortions, and springback. (G4, G6)

96-G. Why Not Spin It? L. F. Spencer. *Iron Age,* v. 167, Mar. 1, 1951, p. 105-109.

Spinning is an ideal forming method for small production quantities, and is of value in larger production runs of parts which would require complex press tooling. Many materials can be spun, and the method is often used as an operation subsequent to deep drawing. Details of the process as applied to different materials, including recommendations for selection of lubricants. (G13)

97-G. High Machinability and Productivity of Ductile Iron. John F. Kahles, Norman Zlatin, and Richard B. Kropf. *Metal Progress,* v. 59, Feb. 1951, p. 238-242. (Based on "U. S. Air Force Machinability Report, 1950," published by Curtiss-Wright Corp.)

Machinability tests were made on four types of flake-graphite and five types of nodular-graphite cast iron. Effects of variations in annealing practice. Cutting speeds vs. metal removed are plotted for the different types. Photomicrographs illustrate structures. (G17, J23, CI)

98-G. 15,000,000 Stampings Per Grind on Carbide Dies. John E. Spofford, Jr. *Steel,* v. 128, Mar. 5, 1951, p. 80-82.

Progressive-die practice of Tinnerman Products, Inc., Cleveland, in which carbide inserts are used at all stations. Increased production, decreased equipment down-time, lower die maintenance costs, and better product quality control have been achieved by use of carbides. (G1, T5, C-n)

99-G. Aluminum Aircraft Parts Hot Formed Successfully. Gilbert C. Close. *Steel,* v. 128, Mar. 5, 1951, p. 84-86.

How Northrop Aviation uses production-line hot forming techniques to fabricate 75S Al alloy airframe components in a fraction of the time formerly required. Oil-bath immersion and electrical resistance are the two heating methods employed. (G1, Al)

100-G. Shot-Peening Springs. Part I. *Mainspring,* v. 13, Feb. 1951, p. 1-4.

New information obtained since 1945. Applicable to a wide variety of

ferrous and nonferrous springs. (G23, T7)

101-G. Impact Stamping Comes of Age. Philip Brenton. *Steel Processing,* v. 37, Feb. 1951, p. 69-73.

Process which makes it possible to obtain stampings in small lots at a reasonable cost. Varied applications in the automotive and aircraft industries. (G3)

102-G. Band Machining Saves Metal. H. J. Chamberland. *Iron Age,* v. 167, Mar. 8, 1951, p. 97-99.

In many machining operations, considerable metal is wasted in chips which would be usable if removed as a solid slug. Preliminary metal removal by band machining cuts this waste. Special method of cutting blanking dies by band machining enables use of the cut-out slug as the punch, saving metal and reducing machining costs. (G17)

103-G. Wraparound Bench Forms Sheet Metal Faster. H. W. Eschedor. *Iron Age,* v. 167, Mar. 8, 1951, p. 100-102.

Machine made largely of angle iron which puts 4 right-angle bends in a roaster-body shell at a rate of 92 pieces an hr. Similar equipment forms the supporting cabinet's door and back panels. (G6)

104-G. The Application of Cutting Fluids to Machining Operations. R. B. Niebusch and E. H. Strieder. *Mechanical Engineering,* v. 73, Mar. 1951, p. 203-207.

Results emphasize the fact that cutting fluids often are not used so as to obtain maximum benefits. Only when a large volume of clean fluid bathes the tool (or wheel) and the actual cutting zone are these benefits obtained. This requirement can be met by making relatively simple, inexpensive modifications to existing cutting-fluid supply systems. Increases in tool life of as much as 100% may be obtained, together with other benefits such as improved surface finish, greater accuracy, and reduction or elimination of steam and smoke. (G21)

105-G. Machining Copper and Copper-Base Alloys. Bartlett West. *Modern Machine Shop,* v. 23, Mar. 1951, p. 100-106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126.

Presents tabular data on machining process. Cutting tool diagrams for the various types. (G17, Cu)

106-G. Raising the Limits of High Speed Steel Machining. W. R. Frazer. *Tool Engineer,* v. 26, Mar. 1951, p. 33-37.

Correlates recent work of various investigators. Effects of heat treatment and composition on cutting ability, grain size, and hardness of toolsteels. Recent developments in milling-cutter design where high rake angles—both radial and axial —are used. Performance data are tabulated. (G17, TS)

107-G. New Tool Removes Casting Defects Quickly. Robert H. Herrmann. *Foundry,* v. 79, Mar. 1951, p. 164, 166-167.

Patented oxygen-jet electric-arc torch known as the Arcit Jet torch is designed to speed cleaning-room operations in removing sand and slag inclusions; cracks; porosity; shrink cavities; gas pockets from chills, chaplets, core anchors, and other casting defects. (G22, E24)

108-G. Engineering Developments in Light Metals. Thomas Piper. *Light Metal Age,* v. 9, Feb. 1951, p. 8-14.

A number of fairly recent developments in machining, hot and cold forming, riveting, and welding of Al and Mg.
(G general, K general, Al, Mg)

109-G. Abrasive Operations in the Foundry. Boyd H. Work. *Canadian Metals,* v. 14, Feb. 1951, p. 23-28, 47-49.

Types of equipment used — machines and abrasives wheels; cost reduction factors. 7 ref.
(G18, E general)

110-G. Oxygen Profiling and Cutting. *Machinery Lloyd* (Overseas Edition), v. 23, Feb. 3, 1951, p. 74-79, 81, 83, 85, 87.

Fundamental theory and some typical examples of modern equipment. (G22)

111-G. Bending. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 23, Feb. 17, 1951, p. 89-92.

The nine bending processes, including spinning; hammering the metal to a formed tool; bending it around a pin or forming tool, between walls; bending it about a fixed pin without walls; folding it over itself or a fixed bar or plate; holding one end firmly in a pivoting vise and preventing the movement of the free end by a fixed stop; forming the metal around a rotating mandrel or forming tool; forcing it between fixed points or walls; and rolling. (G6)

112-G. Metal Abrasive Pellets. *Metal Industry,* v. 78, Feb. 9, 1951, p. 111-112.

Manufacture and uses for peening and shot blasting. (G23, L10)

113-G. Mechanized Production of Railway Laminated Springs. *Engineering,* v. 171, Feb. 9, 1951, p. 149-152.

Procedures and equipment of a British firm. They include press operations, heat treatment, and inspection. (G1, J general, T7, CN)

114-G. The Effect of Manganese Segregations on Machinability; An Appli-

cation of Microradiography. K. J. B. Wolfe and I. R. Robinson. *Metallurgia,* v. 43, Jan. 1951, p. 3-7.

Machinability determinations using drill-life tests indicate that Mn segregations, because of their abrasive nature, increase drill wear and, because of their shape and brittleness, reduce the force required for the cutting operation. An estimate of the Mn content of the segregations is made and discussed in the light of the Fe-Mn equilibrium diagram and transformation curves. (G17, M24, ST)

115-G. "We Turned SAE 1045 at 2150 SFPM." F. J. Fields. *American Machinist,* v. 95, Mar. 5, 1951, p. 102-103.

An inquiry from England asked if it is possible to apply very high speeds to turning operations to get production and economical tool life using commercial carbides. Some tests indicated that speeds of 1500 ft. per min. were not practical for carbide-tool turning of EN9 steel, since failure occurred in ¾ in. Mr. Fields, in reply, gives details of tests in which results indicated in the title were successfully obtained. Believes that even higher speeds can be obtained. (G17, CN)

116-G. Carbide Problems in Contract Tool and Die Shops. *American Machinist,* v. 95, Mar. 5, 1951, p. 172, 174, 176, 178, 180, 182, 184, 186, 188, 190-191, 193-194, 206, 208, 210, 212, 214, 216.

Official transcript of discussion at recent convention of National Tool and Die Manufacturer's Association which dealt with various carbide problems. (G17, G1, T5, C-n)

117-G. Steel Prop Blades Extruded With Internal Taper. E. J. Tangerman. *American Machinist,* v. 95, Mar. 5, 1951, p. 128B-128E.

Process announced jointly by Curtiss-Wright and the U. S. Air Force. The process slashes production time, eliminates welding, and improves product quality. Specially developed mandrels on a ram are apparently used to produce complex internal cross-sections, including long blade taper. Material is Cr-Ni-Mo steel. (G5, AY)

118-G. Getting the Most Out of Machines and Tools. *Steel,* v. 128, Mar. 12, 1951, p. 80-83, 106, 110, 113.

Third of six sections of a report published by Curtiss-Wright on a comprehensive cooperative machinability project sponsored by the U. S. Air Force. (G17)

119-G. Deep-Drawing Aluminum Parts With Low-Cost Dies. Emilio Andreola. *Machinery* (American), v. 57, Mar. 1951, p. 173-179.

Equipment and procedures at Sperry Gyroscope Co.'s plant at Lake Success, N. Y. (G4, Al)

120-G. Cold Extrusion of Steel; Effect of Lubricants, Tool Contours, and Reductions. Hubert Hauttmann and W. M. Baldwin, Jr. *Iron Age,* v. 167, Mar. 15, 1951, p. 99-104.

Summary of the latest information on the Neumeyer process shows that certain phosphate coatings are as good as the best electrolytic porous metallic coatings of zinc. Die apex angles from 40 to 180° were tested. Small die angles gave lowest extrusion pressures and best metal flow. Tool contours were studied in extruding 25 different steels. Transverse toughness of steels reduced 85% is much higher than expected. (G10, ST)

121-G. New Method Machines: Sintered Carbides, Sintered Borides; Hardened Tool Steels. Alvin S. Cohan. *Journal of Metals,* v. 3, Mar. 1951, p. 216-217.

Cavitron process which utilizes ultrasonic vibrations for cutting, threading, drilling, forming, and other machining operations on fully sintered cemented carbides and borides, stellites, hardened tool and die steels, and other hard and brittle materials such as glass, rubies, sapphires, and diamonds. (G17, C-n, TS)

122-G. How to Spin Metals. John W. Lengbridge. *American Machinist,* v. 95, Mar. 19, 1951, p. 145-155.

Special report tells how to estimate costs of spun vs. drawn products. Spinnability ratings for various metals and basic information on the design of spun products. The technique of spinning, the tools and equipment required, and the various production methods employed. (G13)

123-G. Edge Preparation of Plate for Welding. C. A. Heffernon. *Welding Journal,* v. 30, Mar. 1951, p. 221-228.

Flame shaping of steel-plate edges for production welding to assure uniformity of cut surfaces and correct alignment. (G22, K general, ST)

124-G. Flame Gouging for Better Welds in Autoclave Fabrication. *Welding Journal,* v. 30, Mar. 1951, p. 262. (G22, ST)

125-G. New Developments in Flame Cutting Stainless Steel. G. E. Bellew. *Welding Journal,* v. 30, Mar. 1951, p. 265-268.

The main problem is mechanical and chemical, namely removal of refractory oxides, by means of a suitable flux so as not to block the cutting oxygen. (G22, SS)

126-G. Die-Casting: Tooling-Up for Spinning Operations; Tooling-Up for Ironing, Swaging and Bending Opera-

tions. H. K. Barton. *Metal Industry,* v. 78, Feb. 16, 1951, p. 129-130, 132; Feb. 23, 1951, p. 152-153.

Operations on die-cast components applicable to ductile Zn-base alloys. (To be continued.) (G13, G4, G6, Zn)

127-G. (Book) **Machinability and Machining of Metals.** Norman E. Woldman and Robert C. Gibbons. 518 pages. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18. $7.50.

An up-to-date analysis of the metallurgical and machining characteristics of modern metals and alloys. Each group of metals is treated separately. Includes sections on low-carbon and high-carbon steels, tool and die steels, cast irons, aluminum, magnesium, copper, nickel, and zinc-base alloys. (G17)

128-G. Tooling for Limited Production. Gilbert C. Close. *Finish,* v. 8, Apr. 1951, p. 21-24, 88.

General principles applicable to work on experimental models or short-run production of precision parts. Analysis of tooling and tooling processes; plastics as tools; welding fixtures; and metal-forming equipment. (G general, T5)

129-G. How to Stretch-Form Magnesium. *Aviation Week,* v. 54, Mar. 19, 1951, p. 21-22.

Process developed by an aircraft manufacturer. (G9, Mg)

130-G. Hot Dimpling Widens Metal Use. *Aviation Week,* v. 54, Apr. 2, 1951, p. 21-22.

Process as applied to Al and Mg alloys, and used to prepare aircraft sheet metal for flush riveting. "Thermotronic Control Unit" developed by Aircraft Tools, Inc., Los Angeles. (G2, Al, Mg)

131-G. Flow Test of Hubbing Steel. Folke Halward. *Metal Progress,* v. 59, Mar. 1951, p. 356-358.

Hubbing (or "hobbing", as it is often called) instead of machining of cavities, is generally employed when a number of the cavities of the same size and shape are required in a single plastic mold. The method consists of forcing a hardened steel hub of the desired shape into a blank of softer steel. Design and material requirements. Simple test for determining an otherwise unknown "flow property." Proposes a "hubbing number" or index. (G16, AY)

132-G. Spinning Flanged and Dished Wrought Iron Heads. Edward B. Story. *Metal Progress,* v. 59, Mar. 1951, p. 375.

Modified procedure which gave satisfactory results. (G13, Fe)

133-G. Versatile Airplane Sub-Contracting. Howard E. Jackson. *Modern Industrial Press,* v. 8, Mar. 1951, p. 34, 36, 40, 44.

Forming, shearing, rolling, and heat treating equipment and procedures of Castle Industries, Inc., near Seattle, Wash. Miscellaneous metal parts are produced—90% for aircraft. (G general, J general, T24)

134-G. The Spinning of Steel. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 23, Mar. 3, 1951, p. 81-83.

The operation of spinning as it applies to steel, and some practical hints on the types to be used for a given job. Spinning tools and suitable materials. (G13, ST)

135-G. Reduction in Machining Time Resulting From Research. *Machinery* (London), v. 78, Mar. 15, 1951, p. 449-450, 456.

Recent example of increase in production efficiency achieved as a result of work of the Production Engineering Research Assn. with reduction in machining time for drawing dies from 53 to 22 min. Experimental procedure and results. The material was an alloy toolsteel. (G17, TS)

136-G. Shearing of Metal Blanks. T. M. Chang. *Journal of the Institute of Metals,* v. 78, Dec. 1950, p. 393-414.

Effects of clearance, tool shear, and tool curvature in the shearing of circular blanks, of cast iron, mild steel, brass, Cu, Zn, Al, and Pb, ranging in thickness from 0.036 to 0.500 in. (G15, CN, Cu, CI, Zn, Al, Pb)

137-G. The Deep Drawing and Pressing of Non-Ferrous Metals and Alloys. J. Dudley Jevons. *Journal of the Institute of Metals,* v. 78, Jan. 1951, p. 563-619.

Various methods and equipment. Tool materials and drawing lubricants. Inter-stage annealing, with emphasis on faults commonly experienced under industrial conditions and on the incidence of critical-strain crystal growth. Properties of sheet which determine its behavior under the press. Tests applicable to sheet and their limited usefulness in predicting pressworking behavior. A method for routine acceptance testing of sheet is suggested. The phenomena of stretcher-strain markings and of season-cracking. 46 ref. (G4, Q23, EG-a)

138-G. Influence of Mechanical Properties of Metals on the Efficiency of "Liquid Media" During Milling. (In Russian.) G. I. Epifanov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Nov. 21, 1950, p. 415-418.

Investigated for Al, Cu, Sn, Zn, Sb, bronze and cast iron, using butyl alcohol as the "liquid medium" (cut-

ting fluid). Results indicated that the less plastic a metal is, the less it is subject to internal stress during cutting, the less efficient is the cutting fluid, which is a factor accelerating brittle failure. (G21, Q23)

139-G. Significant Operations on the Chrysler Torque Converter. Joseph Geschelin. *Automotive Industries,* v. 104, Apr. 1, 1951, p. 38-42, 88.

Press operations, machining, spot welding, arc welding and brazing operations.
(G general, K general, Al)

140-G. How Tool Life is Affected By Heat Resisting Alloys. *Automotive Industries,* v. 104, Apr. 1, 1951, p. 52, 80, 83. (Based on one chapter of recent book on machinability research, published by Curtiss-Wright Corp.)
(G17, SG-h)

141-G. Microstructure Holds Key to Speedier Metal Cutting. *SAE Journal,* v. 59, Apr. 1951, p. 38-43. (Based on "Increasing Productivity in Production Machining," by Michael Field and Norman Zlatin.)

Results of experimental work on cast irons support above statement. Data are charted and photomicrographs show six cast-iron structures in order of decreasing machinability. (G17, M27, CI)

142-G. New Cutting Torch Uses Gasoline as Fuel. *Iron Age,* v. 167, Apr. 5, 1951, p. 112.

Said to have several advantages over the oxy-acetylene torch. It is claimed to result in an overall saving of 25-30% in such operations as cutting, brazing, scarfing, and similar work. (G22)

143-G. Flame Cutting Machine Adapted for Bevelling. *Industry & Welding,* v. 24, Apr. 1951, p. 38.

In order to reclaim pipe flanges, the Macon Kraft Co., Macon, Ga., has devised a unique method of reusing them without machining.
(G22)

144-G. Measuring and Interpreting the Factors in Tapping Torques. Part I. Allen J. Carruthers. *Tool Engineer,* v. 26, Apr. 1951, p. 25-27.

Relationship between efficiency of a tap and twisting effort required to turn it, and the various factors influencing the relationship. Development of improved electronic dynamometer technique for determination of forces involved. Bonded-wire electric strain gages are used to measure forces involved. Metallurgical and design factors related to the tap and to the tapping machine. (G17)

145-G. Bandsawing in Foundries. Geo. H. Sheppard. *Canadian Metals,* v. 14, Mar. 1951, p. 18-21, 24, 45-46.

Bandsawing of ferrous and nonferrous castings. Production rates, saw life, cutting techniques, and types of saws are correlated with economics of foundry practice.
(G17, E24)

146-G. A Mobile Factory Produces Oil Drums. *Machinery Lloyd,* (Overseas Edition.) v. 23, Mar. 17, 1951, p. 85-88.

Welding and forming equipment and procedures of "factory" which is transported from place to place by truck. (G general, T26)

147-G. The Oxygen Lance for Burning Holes in Concrete, Minerals, and Steel. (In German.) R. Wolf and E. Zorn. *Schweissen und Schneiden,* v. 2, Dec. 1950, p. 333-338.

Various patents and publications. Theories on the method and economics of its application. 12 ref.
(G22, ST)

148-G. Flame Cutting With Propane. (In German.) H. Schulz. *Schweissen und Schneiden,* v. 3, Jan. 1951, p. 2-11.

Principles of flame cutting and equipment and experiments with steel sheets 10-300 mm. thick. 12 ref. (G22, ST)

149-G. Important Recent Publications on Flame Cutting. (In German.) *Schweissen und Schneiden,* v. 3, Jan. 1951, p. 22-25.

A review. 67 ref. (G22)

150-G. Increase in the Hardness of Flame-Cut Edges and Its Removal. (In German.) Gottfried Kritzler and Hermann Thier. *Stahl und Eisen,* v. 71, Feb. 1, 1951, p. 119-124.

Spectrochemical analysis of nine alloy and plain carbon steels showed a decrease in Cr, Mn, and Si; and an increase in C and Mo. Different methods and rates of flame cutting, preheating, and annealing were investigated. 18 ref.
(G22, J23, CN, AY)

151-G. Concerning Single-Term Relationships of Force and Cutting Rate for Different Types of Machining. (In Russian.) A. I. Kashirin and F. A. Barbashov. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Dec. 1950, p. 7-11.

Investigation on theoretical bases reveals possibility of reducing single-term formulas for cylindrical and face milling to a formula for a milling tool, which is a general exponential formula for all types of milling. Experimental and theoretical data are tabulated for high speed toolsteel and for hard-alloy milling of steel and cast iron.
(G17, ST, CI)

152-G. Fundamentals of Processes for Rapid Cutting of Steels. (In Rus-

sian.) E. I. Feld'dshtein. *Stanki i Instrument,* (Machine Tools and Equipment), v. 21, Dec. 1950, p. 15-19.

Results of experimental investigation indicate existence of errors in previous theories, and clarify basic factors affecting tool stability during rapid cutting, which depends on microstructure. Imparting a pearlite structure to medium and high-carbon steels was effective in improving their machinability. 13 ref. (G17, CN)

153-G. How to Cut Steel. H. J. Diehl. *Welding Journal,* v. 30, Apr. 1951, p. 359-361.

Recommended techniques for oxy-acetylene cutting. (G22, ST)

154-G. Fatigue Durability of Prestressed Screw Threads. J. O. Almen. *Product Engineering,* v. 22, Apr. 1951, p. 153-156.

Beneficial effect of superficial rolling on fatigue life of screw threads; fatigue strength of screw threads before and after prestressing with rollers and devices for surface rolling of threads; design of rollers. (G23, Q7, T7, ST)

155-G. Review of Powder Cutting Processes. Part I. *Welding and Metal Fabrication,* v. 19, Mar. 1951, p. 91-98.

Procedures and equipment. (To be continued.) (G22)

156-G. Some Technical Considerations on the Coining of Metals. Paul Huguenin. *Sheet Metal Industries,* v. 28, Apr. 1951, p. 345-352, 356. (Translated from *Pro-Metal,* Apr. 1950.)

Procedures and equipment for coining of miscellaneous ferrous and nonferrous metals. 11 ref. (G3)

157-G. Improvement and Mechanization of Oxygen-Flux Cutting. (In Russian.) S. G. Guzov and O. Sh. Spektor. *Avtogennoe Delo* (Welding), v. 21, Dec. 1950, p. 24-27.

Apparatus by which additional oxygen is introduced directly into the cut by means of a special attachment. Operating characteristics are tabulated for cutting Cr steels of thicknesses up to 200 mm. (G22, AY)

158-G. (Book) Oxygen Cutting. G. V. Slottman and E. H. Roper. 407 pages. 1951. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18. $6.50.

A comprehensive manual of practical oxygen-cutting techniques, as well as a summary of present-day knowledge of the subject. Includes extensive discussions of the many uses to which oxygen cutting can be applied, and historical background material. (G22)

159-G. (Book) Pressworking of Metals; A Reference Book Illustrating and Describing the Uses of Metalworking Presses and Many Types of Press Tool Designs. Ed. 2. C. W. Hinman. 551 pages. 1950. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18. $8.50.

Some 600 press-tool designs, types of presses, attachments, and accessories. Their use with common materials. (G1)

160-G. Pad Your Trimming Dies With Economical Zinc. H. C. Slagle. *American Machinist,* v. 95, Apr. 16, 1951, p. 136-137.

Use of open-back presses to trim Al die castings. To keep die-construction costs down, Zn pads are cast around sample workpieces, then are installed around trimming dies to prevent the die castings from buckling when flash and runners are chopped off. (G15, T5, Al, Zn)

161-G. The Design of Special Hood for Machine Tools. James M. Taub. *U. S. Atomic Energy Commission,* AECD-3048, Aug. 20, 1948, 20 pages.

Various types of hoods used in certain shops of the Los Alamos Laboratory. The machine tools to which most the work has been devoted are Monarch lathes and Milwaukee No. 2H milling machines, which are the most difficult machines to hood. (G17)

162-G. Magnetic Sheet Separator Improves Production. *Iron Age,* v. 167, Apr. 26, 1951, p. 103-104.

Equipment for use in connection with punch-press and shearing operations. Purpose is to separate a stack of sheets by means of repelling magnetic fields, so that punch press operators can easily lift a sheet from the top of a stack and feed it into the press. (G1, ST)

163-G. Engineering Developments in Production Processes. T. E. Piper. *Western Machinery and Steel World,* v. 42, Apr. 1951, p. 70-73.

Miscellaneous new developments in aircraft fabrication, mainly forming, joining, machining, etc. (G general, K general, T24)

164-G. Machining Gas Turbine Alloys. K. J. B. Wolfe and P. Spear. *American Machinist,* v. 95, Apr. 30, 1951, p. 125, 127, 129.

Compositions and machining characteristics of various types are tabulated. Selection of tool materials and cutting fluids. (G17, AY, TS, SG-h)

165-G. Oxy-Acetylene in Steel Fabrication. Charles I. Orr. *Canadian Metals,* v. 14, Apr. 1951, p. 43-44.

Use for material preparation and local heating; edge preparation, shaping of sections, cutting and gouging, and plate straightening. (G22, F29, ST)

166-G. Research Trebles Machining Rate. *Machinery Lloyd* (Overseas Edition), v. 23, Mar. 31, 1951, p. 115, 117.

Work by the Production Engineering Research Assn. of Great Britain. (G17)

167-G. Gas-Turbine Steels; Machining Austenitic and Ferritic Alloys. Part I. Materials, Cutting Tools and Cutting Fluids. Part II. Machining Conditions for Various Processes. K. J. B. Wolfe and P. Spear. *Aircraft Production,* v. 13, Mar. 1951, p. 80-83; Apr. 1951, p. 117-120.

Problems associated with machining of heat resisting and creep resisting steels and alloys. Results of the work of the B.S.A. Group Machinability Research Laboratory on turning, milling, drilling, broaching, grinding, and examination of cutting fluids. Some information on recent work carried out in the U. S. and in Russia. 33 ref. (G17, AY, SS, SG-h)

168-G. Improving Machinability of Ductile Iron by Annealing. J. W. Kahles and R. Goldhoff. *Foundry Trade Journal,* v. 90, Apr. 5, 1951, p. 365-367.

Shows that adequate machinability and physical properties can be obtained in ductile iron without complete pearlite decomposition. Increased Si content accelerates carbon solution, while pearlite breakdown is mainly a function of Mn content. Small amounts of carbide can be tolerated if the matrix is basically ferrite. (G17, J23, N8, CI)

169-G. Glass-Lined Steel Vessels. *Industry & Welding,* v. 24, May 1951, p. 40-41, 83.

Forming and welding operations. (G general, K general, CN)

170-G. Possibilities and Limitations of the Marform Process. Henry P. Hessler, J. E. Broderick, and Fred C. Young. *Machinery* (American), v. 57, May 1951, p. 159-163.

The Marform process employs a rubber forming cushion and precisely controlled hydraulic pressure to form and draw parts of various shapes and materials. Specific information on application and economical use of the process in the manufacture of sheetmetal parts of steel and Al. (G1, Al, ST)

171-G. Stretch Brake Cuts Forming Cost 90%. *Aviation Week,* v. 54, May 7, 1951, p. 42, 44.

Simple hydraulic press attachment which speeds production runs of foil leading-edge skins, developed by Northrop Aircraft. (G9, Al)

172-G. Cutting Bars for Tubing. *Welding Engineer,* v. 36, May 1951, p. 34.

Production in a tube mill has been speeded up considerably by a mechanized set-up for flame-cutting bars to length. It cuts through 5 in. of steel in 20 sec. (G22, CN)

173-G. Fabricating Stainless Steel Sinks at Pride Manufacturing Co. John C. McComb. *Steel Processing,* v. 37, Apr. 1951, p. 172-174.

Blanking, shearing, forming, Heliarc welding, soldering, and mechanical polishing. (G1, K1, K7, L10, SS)

174-G. Shot-Peening Springs. *Mainspring,* v. 13, Apr. 1951, p. 1-4.

Development of cast alloy shot, cut wire shot, and heat treated cast steel shot. Results of work using different types and sizes to peen oil-tempered, carbon steel valve-spring wire. (G23, CN)

175-G. Electric Strain Gage Tool Dynamometers. E. G. Loewen, E. R. Marshall, and M. C. Shaw. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, No. 2, 1951, p. 1-16.

Dynamometers for use in measuring the forces exerted upon metal-cutting tools utilizing electric strain gages. Machining operations involved include planing, drilling, grinding, and turning. The bridge circuits used and mechanical aspects of each unit. Design details of load-measuring elements. (G17)

176-G. Aluminium Beer Barrels. *Metal Industry,* v. 78, Apr. 27, 1951, p. 348-349.

Production by deep drawing. Annealing, seam welding, and inspection procedures. (G4, Al)

177-G. Carbide High-Velocity Turning. Leif Fersing. *Transactions of the American Society of Mechanical Engineers,* v. 73, May 1951, p. 359-374.

Measurements of chip temperature, loads on tools, effect of chip breakers, and the effect of turning speeds on the quality of finished surfaces. Illustrates tools cutting at surface speeds up to 2400 ft. per min. Parts now being machined in the "high-velocity turning range" in production. Most tool-load data were obtained from turning cuts on two types of normalized steel. SAE C1118, cold-rolled, and SAE 8747, hot-rolled. (G17, CN, AY)

178-G. Stress Distribution in the Continuous Chip—A Solution of the Paradox of Chip Curl. E. K. Henriksen. *Transactions of the American Society of Mechanical Engineers,* v. 73, May 1951, p. 461-465; disc., p. 465-466.

The chip passes along the tool face for a certain distance before it leaves the tool and then curls

through space. Assumes that a sudden drop in pressure occurs at the point of ultimate contact, which combines with a single force at this point. Physical origin of this system of forces is explained by surface roughness of the tool, which leads to an explanation of the sharp boundary line for the area of wear on the tool face. Distribution of pressure between chip and tool follows an exponential law. Methods of stress analysis which should be useful in further investigations. (G17)

179-G. Superior Machinability of MX Explained. F. W. Boulger, H. A. Moorhead, and T. M. Garvey. *Iron Age,* v. 167, May 17, 1951, p. 90-95.

It was found that a slight difference in Si content has more effect on machinability than either C or P over the normal ranges found in bessemer steels. Data to explain variations in machining among free-cutting steels of the same specification. (G17, CN, SG-k)

180-G. More Production and Better Quality by Cold Extrusion. *Product Engineering,* v. 22, May 1951, p. 118-119.

New developments specifically in extrusion of steel and Al. (G5, ST, Al)

181-G. Flexible Dies to Improve Deep Drawing Techniques. *Product Engineering,* v. 22, May 1951, p. 131.

Marform and Hydroform developments. (G1)

182-G. Finishing Home Freezer Cabinets. Arthur Q. Smith. *Products Finishing,* v. 15, May 1951, p. 16-24.

Equipment and procedures. Stamping and forming of sheet steel, cleaning, phosphatizing, spray finishing, assembly, and testing. (G general, L general, ST)

183-G. Stress Analysis of Reverse Redrawing of Cylindrical Shells. S. Y. Young. *Sheet Metal Industries,* v. 28, May 1951, p. 453-458.

Details of theoretical analysis and experimental investigation. Results are compared and typical calculations presented. (G4, Q25)

184-G. Bumper Guards Deep Drawn 220 per Hour. *Steel,* v. 128, May 14, 1951, p. 88.

Picture story of operations at Ueber Tool & Mfg. Co., Detroit. (G4, ST)

185-G. Cold Forming of Low Carbon Steel. Part II. Lester F. Spencer. *Steel Processing,* v. 37, Apr. 1951, p. 184-187.

Evaluation for drawability and the drawing operation itself. Concludes section on aging difficulties. (To be continued.) (G4, CN)

186-G. Effects of Light Peening on the Yielding of Steel. Howard L. Harrison and Blake D. Mills, Jr. *Welding Journal,* v. 30, May 1951, p. 251s-253s.

Results of exploratory investigation of mild steel strips indicate a number of interesting features of the behavior of constant-stress members under light transverse hammering. Even when the steady stress was less than half the yield point, a few hundred light blows of a flat-faced hammer caused quite appreciable plastic elongation. (G23, Q23, ST)

187-G. Pressure Vessel Design Effects of Pressurizing. R. E. Cecil. *Welding Journal,* v. 30, May 1951, p. 424-434.

Testing thin-walled pressure vessels at a test pressure in excess of the working pressure reshapes the heads and areas around the openings and acts as a stress relieving operation. Fundamental and empirical considerations and evaluation of test requirements. Accuracy of the jacket test for heads only was determined. (G23, Q25)

188-G. Seat-Manufacture: Design and Production of Aircraft Passenger-Chairs. Part III. Design Variations; Single-Passenger Chair Manufacture; Machine Pipe-Bending. L. G. Burnard. *Aircraft Production,* v. 13, May 1951, p. 147-153.

Includes information on press bending, torch welding, assembly, upholstering, etc. (G6, K2, T24)

189-G. Solid Carbide Saws Cut Clean and Fast. Chester S. Ricker. *American Machinist,* v. 95, May 28, 1951, p. 120-121.

Various types and their applications to miscellaneous jobs. (G17, T5, C-n)

190-G. Prelocation Simplifies Turbine Blade Location. George Elwers. *Iron Age,* v. 167, May 24, 1951, p. 90-92. 90-92.

Fixtures to hold gas-turbine blades for machining would be complex and expensive. Fixtures to hold square boxes are simple, so blades are prelocated in boxes with an optical inspection device, then cast in place. Tips and roots, on which machining is to be done, protrude. (G17)

191-G. New Drawing Process Announced. *Iron Age,* v. 167, May 24, 1951, p. 97.

New mehtod of rubber-pad forming and drawing of sheet metal announced by Consolidated Vultee Aircraft Corp. Known as the Hidraw process, it utilizes a tough rubber pad in a restrictor box on the upper platen of the press, with a pressure pad and a moving punch on the lower platen. (G8)

192-G. Automatic Spinning of Stainless Steel in Production. L. W. Court.

Materials & Methods, v. 33, May 1951, p. 86-87.

While stainless is rather difficult to spin, the process shows definite advantages over press forming on parts made of light-gage stock. (G13, SS)

193-G. Fundamentals of the Working of Metals. Part XXII. Difficulties Encountered in Simultaneous Forming. George Sachs. *Modern Industrial Press,* v. 13, May 1951, p. 6, 8, 26.

Definition and basic types of progressive work; simultaneous and progressive forming; forging difficulties due to simultaneous forming; interference in multiple blanking; and forming of corrugations. (G1)

194-G. Deep Drawing With 'Rubber Dies.' Fred Young. *Modern Metals,* v. 7, May 1951, p. 28-30.

Marform rubber-pad forming process. (G1)

195-G. Redesign Boosts Production With High Speed Steel Cutters. Guy Hubbard. *Steel,* v. 128, May 28, 1951, p. 76-77.

Results attained by a number of companies—show that under certain conditions high speed steel milling cutters can be made to turn out production approaching even that of tungsten carbide cutters. Radical changes in shape of milling-cutter teeth are responsible. (G17, TS)

196-G. 20 Miles of Pipe Per Day. *Steel,* v. 128, May 28, 1951, p. 78-80.

Equipment and procedures of new Napa, Calif., plant of Basalt Rock Co. Includes forming and submerged-arc welding. (G6, K1, CN)

197-G. Shaping Components With the Rotary Contour Former. *Western Machinery and Steel World,* v. 42, May 1951, p. 92-94.

Use of the Bath Roto-Former at Boeing Airplane Co.'s Wichita Div. The metals formed are 24S and 75S Al, SAE 4130 and stainless steels, Mg, and Ti. (G6, T24, Al, AY, SS, Mg, Ti)

198-G. Testing the Deep Drawability of Sheet Metal. Cup-Drawing Test and Bulge-Testing Process. (In German.) G. Oehler. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, May 1, 1951, p. 371-374.

Critically evaluates test methods. Experience showed the second method to have serious disadvantages as compared to the first. Procedure of the cup-drawing test. 23 ref. (G4, Q23)

199-G. Plastic Deformation Measurements During Lathe Turning. (In German.) W. Leyensetter. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, May 1, 1951, p. 375-378.

Tests made to determine the reciprocal effect between the cutting tool and the steel being machined. Results show that compression of the steel depends on cutting rate, cutting angle, work material, tool-steel, and cutting conditions. The deformation factor was also found to be very sensitive to changes of the cutting edge. (G17, Q28)

200-G. How to Produce More Holes With Your Drills. R. J. Sack. *Machinery* (American), v. 57, May 1951, p. 143-150; June 1951, p. 183-186.

Includes table of suggested speeds, drill angles, and coolants for use in drilling various materials. Suggested speeds and feeds for drilling; recommended coolants and cutting compounds; importance of proper drill sharpening; and essential requirements in correct drill sharpening. Second part: advantages of machine grinding; web-thinning procedure; recommended abrasive wheels; and inspection methods. (G17)

201-G. Possibilities and Limitations of the Marform Process. Henry P. Hessler, J. E. Broderick, and Fred C. Young. *Machinery* (American), v. 57, June 1951, p. 166-171.

Use of a rubber cushion or pad, in conjunction with precisely controlled hydraulic pressure, for forming and drawing parts of various materials and shapes. Formability of various materials and shapes, shearing and trimming, tooling, etc. (G1)

202-G. New Process for Producing Holes in Hard Metal. A. Kuris. *Machinery* (American), v. 57, June 1951, p. 175-176.

How holes, recesses, or external contours of various shapes can be quickly formed in carbide or other hard materials by means of a new method; involves use of rapidly vibrating tool operating in a mixture of water and abrasive. (G17)

203-G. How to Drill Cast Iron With Carbide Twist Drills. *Machinery* (American), v. 57, June 1951, p. 195-197.

Recommendations of Carboloy Co. (G17, T5, CI, C-n)

204-G. Carbide Drills Increase Tool Life on Cast Iron. E. J. Weller, E. J. Bonesteel, and F. W. Lucht. *Iron Age,* v. 167, May 31, 1951, p. 75-79.

Test procedure was to determine, first, the characteristics of different types on a laboratory basis, and then to follow this with production testing of a single drill style tipped with different grades of carbide. Data on thrust, vibration, torque, horsepower, and drill reconditioning. Drills and apparatus. (G17, T6, CI, C-n)

205-G. Effects of Precompression on the Behavior of the Aluminum Alloy 24ST4 During Cyclic Direct Stressing. S. I. Liu. *Journal of Metals,* v. 3, June 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 452-456.

Strain history of the alloy was extended to the combination of a single prestrain in tension or compression followed by balanced strain cycles of a selected magnitude. It was found that only compressive initial prestrains could be investigated with sufficient accuracy. A study was also made of the effect of intermediate re-solution heat treatment on low-cycle fatigue behavior. 11 ref. (G23, Q7, Al)

206-G. How to Design and Build Plastic Tooling for Press Production. A. E. Noble. *Magazine of Tooling and Production,* v. 17, June 1951, p. 48-49, 104, 108, 113, 117, 132.

Varied examples in the aircraft industry. Emphasizes advantages and suggests adoption by other industries. (G1)

207-G. Specification and Application of Automotive Drawing Compounds. James T. O'Reilly. *Magazine of Tooling and Production,* v. 17, June 1951, p. 50-51, 88, 96-97, 100-101.

Emphasis is on press-forming operations on low-carbon steel, and on practice, rather than theory. (G21, CN)

208-G. Deep Draw and Waffle Forming. Gilbert C. Close. *Modern Machine Shop,* v. 24, June 1951, p. 90-96, 98, 100, 102-103.

Application of the metal-forming process in which a metal sheet is compressed in one direction while being elongated in another to provide for greater deformation of the sheet. Design standards meet the critical tolerances and safety factors involved in aircraft production. (G4)

209-G. Ball Extruding Buick Torque Tube Flanges. Fred W. Vogel. *Modern Machine Shop,* v. 24, June 1951, p. 136-138.

An interesting forming operation which has enabled Buick to considerably increase flange production. Possibility of other applications. Material is SAE 1008 steel. (G5, CN)

210-G. Designing Drawing and Redrawing Dies. C. W. Hinman. *Modern Machine Shop,* v. 24, June 1951, p. 140-143, 146, 148.

Operating principle of drawing dies and several designs of such dies. (G4)

211-G. How to Drill Cast Iron With Carbide Twist Drills. Fred W.. Lucht. *Modern Machine Shop,* v. 24, June 1951, p. 220-222, 224, 226, 228, 230.

(G17, T6, CI, C-n)

212-G. Metal Spinning Now a Mass-Production Tool. Dan Reebel. *Steel,* v. 128, June 4, 1951, p. 88-91, 114.

Newly designed lathe equipment which easily handles Types 430 and 446 stainless alloys — materials which heretofore were considered to be nonformable. Diagrams show basic shapes that can be successfully spun, also principles of redesign for spinning. Table gives relative adaptability of a wide variety of metals and alloys to spinning. (G13)

213-G. How to Drill Cast Iron With Carbide Tipped Twist Drills. Fred W. Lucht. *Steel,* v. 128, June 4, 1951, p. 92-93.

How increased production and longer tool life are being obtained, using conventional machines to drill cast iron at high speeds. (G17, CI, C-n)

214-G. Production Techniques as Defence Reserves. D. F. Galloway. *Engineer,* v. 191, May 18, 1951, p. 639-644.

Work of the Mechanical Engineering Research Organization, a British group initiated by the Institution of Mechanical Engineers for research on fundamental aspects of metal machining and forming, and methods for improvement of industrial productivity. Several examples, including graphs and tables showing results of machining and drilling tests. Factors affecting typical machining and presswork operations; some experimental equipment. (G general)

215-G. Deep Drawing of Hollow Articles of Heavy Sheet Steel. (In German.) Ulrich Bauder. *Stahl und Eisen,* v. 71, May 10, 1951, p. 500-512.

Optimum methods were determined mathematically. Diagrams, photographs, tables, and graphs. 19 ref. (G4, ST)

216-G. Industrial Measurement of the Guide Length of Drawing Dies. (In German.) Werner Lueg. *Stahl und Eisen,* v. 71, May 10, 1951, p. 517-521.

A new method for measuring length of the tapered guide hole of dies with and without rounded edges. Graduations on the instrument directly indicate the guide length. It can be used to determine rapidly the position of the guide in the hard-metal core and in the mounting. (G4)

217-G. Reducing Internal Stresses in Cold-Drawn Materials by Burnishing. (In German.) Hans Bühler. *Stahl und Eisen,* v. 71, May 10, 1951, p. 521-522.

Investigations on plain-carbon steel showed that burnishing not only increases surface quality and strength, but also converts undesirable tensile stresses of cold drawn material into desirable compressive stresses. (G23)

218-G. Progressive Die Makes Tiny Cups. Pierre Wilmus. *American Machinist,* v. 95, June 11, 1951, p. 138-139.

Punching operation is shown in a series of diagrams and photographs. 50,000 finished J-section Ni cups can be turned out per month. (G2, Ni)

219-G. Acid Pickle Doubles Tool Life on CI. J. Datsko. *American Machinist,* v. 95, June 11, 1951, p. 140-141.

Research at University of Michigan shows the interior of a sand casting can be machined with high speed steel tools 88% faster than the surface. Pickling in hydrofluoric acid increases surface machinability 80% however, and lengthens tool life 45 times. (G17, L12, CI, TS)

220-G. Machine Lapping With Continuously Fed Free Abrasives. Fred L. White. *American Machinist,* v. 95, June 11, 1951, p. 161-165.

A method which produces light-band flatness and fine finish in fast, preset time cycles. Tables show characteristics of various types of abrasives, and stock-removal rates for different types of material. (G19)

221-G. The Mechanism of Grinding and the Function of the Lubricant. J. O. Outwater. *Lubrication Engineering,* v. 7, June 1951, p. 123-124, 144.

Behavior of single grains of abrasive in contact with metal. The chemical reaction between the metal being ground and the atmosphere in which it is ground is a dominating factor in grinding. The lubricant is effective only after the cutting has been completed. Its effect on cooling the surface of the metal is negligible, its purpose being to prevent the bulk of the metal from overheating and to reduce the friction between the severed chip of metal and the bulk of the uncut metal. (G18, G21)

222-G. Balanced Gear-Tooth Design. John C. Straub. *Machine Design,* v. 23, June 1951, p. 178-180, 218, 220. (A condensation.)

How shot peening increases bending strength and permits design for greater scoring resistance. (G23, T7)

223-G. Cold Forming of Low Carbon Steel. Part III. Lester F. Spencer. *Steel Processing,* v. 37, May 1951, p. 232-234.

Steps in deep drawing of typical simple pieces. (To be continued.) (G4, CN)

224-G. Production Developments; Some American Post-War Developments in Airframe Tooling. T. E. Piper. *Aircraft Production,* v. 13, June 1951, p. 187-193.

Most of the developments described are of the limited-production type of tool and include forming, fabricating, and welding equipment. (G general K general, T24)

225-G. Economic and Engineering Aspects of Machinability and Formability in Production Practice; Implications of Some Recent Experiments and Experiences. D. F. Galloway. *Research,* v. 4, June 1951, p. 263-273.

See abstract of "Production Techniques as Defense Reserves," *Engineer,* item 214-G, 1951. (General)

226-G. Oxygen-Flux Cutting of Cast Iron. (In Russian.) S. G. Guzov and O. Sh. Spector. *Avtogennoe Delo* (Welding), v. 22, Jan. 1951, p. 16-18.

Proposes a new method applicable to cast-iron billets up to 360 mm. in diam. (G22, CI)

227-G. (Book) **Metal Processing. Ed. 2.** Orlan William Boston. 763 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $7.50.

Machine processes, accessories, and tools. Correlation between design, metals, and manufacturing of a product. Steps involved in designing for production are covered in the first chapter. Subsequent chapters treat the various classes of machines and the processes and factors with which they are involved. Engineering specifications and standards are provided, together with pertinent references. (G general, S14)

228-G. Spinning Head Sends Head Cost Spinning. Charles J. Sabo. *American Machinist,* v. 95, June 25, 1951, p. 108-109.

Equipment and procedures for production of swivel-hook assembly. 75% reduction in costs results from use of a spinning attachment on a 4-slide machine. Material is steel. (G13, CN)

229-G. Developments and Present Status of Thread Rolling. A. Bradford Reed. *American Society of Mechanical Engineers,* Advance Paper 50-F-19, 1950, 16 pages.

Development of thread rolling from its origin to the present, with particular emphasis on developments of the last few years. Desirable results that can be obtained from use of the operations, limitations inherent in the process. (G12)

230-G. Drilling Cast Iron With Carbide Tipped Tools. Fred W. Lucht. *Automotive Industries,* v. 104, June 15, 1951, p. 98, 102, 105.

(G17, CI, C-n)

231-G. Plastic Tools for Light Metals. Gilbert C. Close. *Light Metal Age,* v. 9, June 1951, p. 8-10.

Use at Northrop Aircraft Inc., for forming tools for Al and Mg and their alloys. (G general, Al, Mg)

232-G. How to Drill Cast Iron With Carbide Twist Drills. Fred W. Lucht. *Machine and Tool Blue Book,* v. 47, July 1951, p. 125-126, 128-130, 132, 134.

(G17, T5, CI, C-n)

233-G. Hot Metal Machining. Sam Tour. *Metal Progress,* v. 59, June 1951, p. 793-794. (Based on comments made by the author at one of the high-production sessions at the Oct. 1950 ASM convention.)

Technique makes possible metal-removal rates for low-carbon, medium-carbon, Cr, Ni, and stainless steels 3-4 times over those possible with conventional machining. Certain of the high-temperature alloys that are supposed to be difficult to machine are readily machined with this method. For example, Allegheny Ludlum Steel Corp.'s S-816 was machined at a rate of 270 cu. in. per hr., as compared with the usually recommended metal-removal rate of 2.1 cu. in. per hr. (G17)

234-G. Fundamentals of the Working of Metals. Part XXIII. Tandem Die Forming. George Sachs. *Modern Industrial Press,* v. 13, June 1951, p. 6, 8, 34.

Design and applications of tandem dies. (G6)

235-G. The Hardness of Oxygen-Cut Surfaces and Their Softening by Heat Treatment. Gottfried Kritzler and Hermann Thier. *Welding Journal,* v. 30, June 1951, p. 282s.

Condensed from paper in *Stahl und Eisen.* See item 150-G, 1951. (G22, J23, CN, AY)

236-G. Economical Motor Car Body Production. H. R. Smith. *Machinery* (London), v. 78, June 7, 1951, p. 941-947.

Equipment and procedures of Kaiser-Frazer Corp. Forming and other press operations and welding are emphasized. (G1, K general, T21, CN)

237-G. A Review of Impact Extrusion and Some Related Processes. George Sachs. *Sheet Metal Industries,* v. 28, June 1951, p. 533-538, 546.

Principles and processes. (G5)

238-G. How to Mill, Roll, Grind Threads for Production. William M. Stocker. *American Machinist,* v. 95, July 9, 1951, p. 145-168.

Special report compares methods and apparatus used in above processes for screw-thread production. (G17)

239-G. Using Oxyacetylene Processes for Fabricating Piping. E. P. Auler. *Heating, Piping & Air Conditioning,* v. 23, July 1951, p. 102-105.

Use for cutting, shaping, and heating of steel pipe during its fabrication into systems. (G22, CN)

240-G. Basic Facts Concerning the Use of Coated Abrasive Belts for Weld Grinding and Finishing. Ralph William Reed. *Industry & Welding,* v. 24, July 1951, p. 33-34, 37, 76-77. (G18)

241-G. Unusual Multislide Machine Shown at Festival of Britain. *Iron Age,* v. 167, June 28, 1951, p. 70.

In addition to forming stations for wire products, the machine includes a press station for working strip up to ¾ in. wide. The standard machine has 4 slides mounted, but any number up to 6 radial slides can be accommodated, each separately adjustable for timing, stroke, and dwell. (G1)

242-G. Machine Hot-Forms Tubing Into Complex Parts. John Kolb. *Iron Age,* v. 167, June 28, 1951, p. 78-80.

Equipment and procedures by which tubing up to 10 in. in diam. is precision-sized and then hot formed into complex, finished parts. A combination of convergent-divergent sections, graduated diameters, wall thicknesses, and closed ends is obtainable. To date, carbon steels, alloy steels, certain stainless steels, and Al alloys 14S and 61S have been successfully formed by the Westin machine. Braces and struts for aircraft landing and flap-control gear, rocket and "jato" bodies with convergent-divergent nozzles, compressed-gas bottles, completely closed tubes, conveyor rolls, and other parts requiring reduced sections with heavier walls have been fabricated in quantity. (G general)

243-G. Shotpeening as a Factor in the Design of Gears. John C. Straub. *Mechanical Engineering,* v. 73, July 1951, p. 565-569.

See abstract of "Balanced Gear-Tooth Design," *Machine Design.* See item 222-G, 1951. (G23, T7)

244-G. Cold Forming of Low Carbon Steel. Part IV. (Concluded.) Lester F. Spencer. *Steel Processing,* v. 37, June 1951, p. 280-283.

Factors influencing selection of lubricant for forming operations, types of lubricants used in press drawing metal, press equipment and tooling, choice of toolsteels, and die materials. 27 ref. (G21, TS, CN)

245-G. Machinability Measurements on Constant-Pressure Lathes. Francis W. Boulger. *Tool Engineer,* v. 27, July 1951, p. 25-30.

The property of "machinability" is defined and discussed. Test equipment for its measurment. Charts show correlation between machinability ratings and various laboratory testing methods. 10 ref. (G17, ST)

246-G. Hydro-Sizing. E. A. Schrodeck. *Western Machinery and Steel World,* v. 42, June 1951, p. 72-73.

Fabrication of an aircraft fuel storage tank, and problems of weld-

ing, trimming, and hydraulic forming and sizing operations. (G1, K1)

247-G. Measuring Tool Loads. *Western Machinery and Steel World,* v. 42, June 1951, p. 78.

Equipment and methods. (G17)

248-G. Wood Manufacturing Co. Gets Low Cost and Design Flexibility With Welded Components. Fred M. Burt. *Western Metals,* v. 9, June 1951, p. 48-49.

Components used by the above company, which manufactures road mixers. Use of torch cutting, gas and arc welding operations. (G22, K1, K2)

249-G. Deep Draw Aluminum Barrels; A Light Container for Fluid Packaging. Hugh G. Jarman. *Canadian Metals,* v. 14, June 1951, p. 42, 44.

Five deep-drawing operations produce the barrel halves which are then annealed and welded. (G4, Al)

250-G. Shot Peening; Effect on the Fatigue Properties of 18-8 Chromium-Nickel Steel. W. E. Bardgett and F. Gartside. *Iron and Steel,* v. 24, June 1951, p. 195-197.

Experimental data are charted, tabulated, and discussed. (G23, Q7, SS)

251-G. Hot Brass Pressing. *Machinery* (London), v. 78, June 21, 1951, p. 1039-1044.

Modern practice and equipment. (G1, Cu)

252-G. Oxy-Acetylene and Oxypropane Flames Applied to Processes of Oxygen Cutting. (In French.) R. Credeville. *Journal du Four Electrique et des Industries Electrochimiques,* v. 60, May-June 1951, p. 60-65.

Relative efficiency of the two. It was concluded that oxyacetylene is much the cheaper, considering the relative amounts of O_2 used, and the cutting time required. Data on cutting of mild steel using the two gases are comparatively charted and tabulated. (G22, CN)

253-G. Coolant Flood Improves Carbide Performance. Wackch Iwascheff. *Iron Age,* v. 168, July 19, 1951, p. 112-114.

Tests made during turning of 40,000 carbon steel shell forgings with automatic lathes prove the value of an enveloping flood of coolant in improving carbide tool performance. Surface speed was increased, surface finish improved, and tool life increased as much as 10 times. (G21, G17, CN, C-n)

254-G. (Book) **Principles and Methods of Sheet-Metal Fabricating.** George Sachs. 526 pages. 1951. Reinhold Publishing Corp., 330 W. 42nd St., New York 18. $10.00.

Principles of numerous sheet-metal forming methods. Theory of deformation of sheet metal and tubing; metallurgical effects produced in stamping, drawing, extruding, bending; practical operations involved; design of parts and dies, and the production equipment used. (G general)

255-G. (Book) **Punching, Shearing, Bending.** William C. Tucker. 80 pages. Buffalo Forge Co., 490 Broadway, Buffalo, N. Y. $3.00.

A pocket-size handbook intended for men operating metal-fabricating machines; for those responsible for keeping them in proper working order; and for designers of work for these types of machines. (G2, G6, G15)

256-G. (Book) **Tool Engineering.** A. P. Gwiazdowski. 306 pages. C. C. Nelson Publishing Co., Appleton, Wis.

A broad survey of machines and methods used in American industry today. Production of a typical part is used to maintain logical sequence in discussing processing and machining operations. Various machining, inspection, and gaging methods; heat treatment of ferrous alloys; and welded assembly of jigs and fixtures. (G17, T6)

257-G. (Book) **Zerspanung und Werkstoff.** (Machining and Materials.) Ed. 2. E. Brödner. 256 pages. 1950. Verlag W. Girardet, Essen, Germany. 18.50 Dm.

The principles of machining and machinability. Effects of cutting fluids and coolants and the various machining operations. Tool materials —ferrous, nonferrous, and plastic, including the various toolsteels, hard metals, and diamonds. (G17, TS)

258-G. Heavy Equipment for Making Large Road Building Machines. *Automotive Industries,* v. 105, July 15, 1951, p. 34-35.

Large presses for blanking and forming. Heavy welding using both hand and machine methods, particularly the hidden-arc process. (G1, K1, T4)

259-G. Stretch Forming With Flexible Equipment. *Automotive Industries,* v. 105, July 15, 1951, p. 38-39.

Method for flexible stretch forming now in use at Northrop Aircraft, Inc. (G9)

260-G. Many Close-Tolerance Operations in Machining Ford-Mercury Automatic Transmissions. Joseph Geschelin. *Automotive Industries,* v. 105, July 15, 1951, p. 46-50, 96, 100, 102, 104.

An introductory study of automatic transmission manufacture. Major highlights of operations at Warner Gear Plant. (G17, T21)

261-G. Expanding Rubber Forms Parts. Thomas L. Self. *Aviation Week,* v. 55, July 23, 1951, p. 32, 34, 39.

Technique for forming metal to complex contours by an internal expanding rubber die. (G8, Al, CN)

262-G. Flame-Cutting Steel With Propane. *Foundry Trade Journal,* v. 91, July 5, 1951, p. 10.

Experiments carried out in Germany with acetylene and propane to determine which is more suitable for cutting purposes. Features of propane. (G22, ST)

263-G. Phosphate Lubricant Aids Cold Extrusion of Steel. *Iron Age,* v. 168, July 26, 1951, p. 76-77.

Cold extrusion of steel has been made easier with a phosphate lubricant. This new lubricant cuts down tool maintenance and down-time and has increased cold working output rates. (G21, CN, AY)

264-G. Hot Brass Pressing. *Machinery* (London), v. 79, July 5, 1951, p. 20-25.

Typical procedure of the Deritend Stamping Co., Ltd. Illustrations of machinery used, and discusses treatment and metallurgical control of the metal. (G1, Cu)

265-G. Making the Ferguson Plough. *Machinery* (London), v. 79, July 12, 1951, p. 47-55.

Production methods. Details on grinding, drilling and shaping of parts. (G general, T3)

266-G. The Autofrettage Treatment of Gun Barrels. *Machinery* (London), v. 79, July 12, 1951, p. 59-61.

Autofrettage process as a means of inducing hoop stresses in the barrels. The effective yield point of the material and tensile strength are considerably increased. (G23)

267-G. Effect of Structure on Machinability Demonstrated. Norman Zlatin and Leonard Nowikowski. *Iron Age,* v. 168, Aug. 2, 1951, p. 95-98.

Investigation of 3140, 4140, and 8640 steel shows that machining properties are the same when they have been heat treated to the same structure. Structure is a better criterion of machinability than chemical composition. Differences in structure mean less when carbide tools are used. Resulfurizing to about 0.1% improves machinability. Includes photomicrographs and graphs. (G17, M27, AY)

268-G. Frame Cutting Multiple Parts for Diesel Locomotives. Harry S. Swan. *Steel Processing,* v. 37, July 1951, p. 332-335, 361.

Illustrates and describes the operation. (G22, T23)

269-G. How to Lower the Cost of Prototype Stampings. O. H. Wismer. *Steel Processing,* v. 37, July 1951, p. 340-342.

Tooling costs can be lowered by eliminating intermediate mockups or patterns whenever possible, and by using wood, plastic, or similar material as a substitute for metal in mated dies. (G3)

270-G. Flame Processes Assist Pipe Fabrication. Edgar P. Auler. *Welding Engineer,* v. 36, Aug. 1951, p. 22-25, 56-57.

Application of oxyacetylene flame-cutting, flame-gouging, and flame heating, to steel pipe fabrication. Benefits are cited. (G22, J2)

271-G. A More Realistic Measure of Shot Peening Effectiveness. Charles Lipson. *Steel,* v. 129, Aug. 6, 1951, p. 72-75.

Fatigue strength, not fatigue life, is said to be a more logical yardstick to apply to determine improvement in performance of surface-treated parts subject to fluctuating loads. Nine factors are evaluated on this basis. 17 ref. (G23, Q7, ST)

272-G. Raising the Limits on Carbide Machining. W. P. Coomey. *Tool Engineer,* v. 27, Aug. 1951, p. 29-31.

Factors to be considered in evaluating possibility of use of higher speeds. (G17)

273-G. Engineering "Know How" Makes Possible World's Largest Pipe Bends. *Industry & Welding,* v. 24, Aug. 1951, p. 28-29, 68-69.

An ingenious method for bending large diameter pipe—up to 8 ft. in diameter—developed by M. W. Kellogg Co. (G6)

274-G. Vibratory Press Speeds Swaging Job 800 Pct. *Iron Age,* v. 168, Aug. 9, 1951, p. 71.

An 8-ton oil-hydraulic press with unique tooling used to swage caulking-gun tips from ½-in. steel tube. (G1)

275-G. Designing Drawing and Redrawing Dies. C. W. Hinman. *Modern Machine Shop,* v. 24, Aug. 1951, p. 154-156, 158, 160, 162, 164.

Recommended practice for drawing 18-8 stainless steel. (G4, SS)

276-G. Transparent Cutting Oils Offer Important Advantages. J. C. Van Gundy. *Machinery* (American), v. 57, Aug. 1951, p. 177-180.

The primary advantage of transparent cutting oils is that the operator can observe the cutting tool and workpiece through the fluid. Active type sulfurized cutting oils, noncorrosive type cutting oils, and oils used in grinding operations are discussed. (G21)

277-G. Engineering for Producibility. Roger W. Bolz. *Machine Design,* v. 23, Aug. 1951, p. 133-156.

Setting up of the organization, designing for economy, production design, cost and quality. Tables give machinability ratings of a wide variety of metals and alloys, also relative "severity" of different machining operations. (G17)

278-G. Deep Drawing From Heavy-Gauge Steel Plate. Ulrich Bauder. *Engineers' Digest,* v. 12, July 1951, p. 212-215. (Translated and condensed.)

Previously abstracted from *Stahl und Eisen.* See item 215-G, 1951. (G4, ST)

279-G. Deep Draw Production of Automobile Bumper Guards. *Magazine of Tooling and Production,* v. 17, Aug. 1951, p. 54-55.

Production methods. (G4, ST)

280-G. Review of Power Cutting Processes. Parts 2 and 3. R. E. Dore. *Welding & Metal Fabrication,* v. 19, June 1951, p. 217-223; July 1951, p. 253-258, 268.

Health safeguards and operational data relating to the flux-injection, the Fe-powder, and the oxy-kinetic processes. Metallurgical aspects. Deals exclusively with steels. (G22, ST)

281-G. Cleaning Castings by Oxy-Acetylene. *Canadian Metals,* v. 14, July 1951, p. 23.

In new process, called Powder-Washing, an iron-rich powder is fed through oxy-acetylene preheat flames into a low-velocity oxygen stream where it burns and produces super-heated liquid iron oxide. Heat from combustion of the powder and from the slag simplifies and speeds removal of metal and metal-sand mixtures. (G22)

282-G. Preparing Plate Edges for Production Welding. C. A. Heffernon. *Machinery* (London), v. 79, July 26, 1951, p. 147-151.

Equipment used in providing different edge forms. The types of machines are either cutting apparatus which travels along a straight-line track or fixed apparatus, past which the material is moved. (G22, ST)

283-G. Machining Austenitic and Ferritic Gas-Turbine Steels. K. J. B. Wolfe and P. Spear. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 233-242.

Previously abstracted from *Aircraft Production.* See item 167-G, 1951. (G17, AY, SS)

284-G. Trimming Light Alloys. (In French.) *Fonderie,* v. 65, May 1951, p. 2483-2494.

Methods of trimming with a saw and by grinding. (G17, G18, Al, Mg)

285-G. Some Aspects of Steel Machinability. (In Italian.) L. Locati and T. Natale. *Metallurgia Italiana,* v. 43, May 1951, p. 164-169.

Determination of index for machinability from temperature of tool point, and application to case hardened and free-cutting steels. 14 ref. (G17, ST)

286-G. A Study of Tool Cutting Capacity. (In Italian.) M. Cociglio. *Metallurgia Italiana,* v. 43, May 1951, p. 170-175.

Reviews the literature and suggests a method based on wear at constant speed and path. (G17, ST)

287-G. Cold-Drawn Pinions and Small Gears. *American Machinist,* v. 95, Aug. 20, 1951, p. 113.

Process is akin to wiredrawing. A dense cold worked surface is produced with high durability, accurate enough so no machining of the drawn shape is required. The process is applicable to miscellaneous ferrous and nonferrous materials. (G4, T7)

288-G. Cold Spin-Dimpling Process for Light Alloy Sheets. *Automotive Industries,* v. 105, Aug. 15, 1951, p. 41.

Process and equipment developed by a British firm. (G13, Al, Mg)

289-G. Consumer Installs Slitting and Leveling Plant. *Iron Age,* v. 168, Aug. 23, 1951, p. 78-80.

Precision flatness and more accurate cutting of steel coil stock for movable steel interiors are achieved by means of a new slitting, shearing and precision leveling plant of E. F. Hauserman Co., Cleveland. (G15, ST)

290-G. Understand Basic Metal Cutting Processes If You Want to Evaluate Cutting Fluids. M. Eugene Merchant. *Machine and Tool Blue Book,* v. 47, Sept. 1951, p. 145-146, 148, 150, 152, 154, 156, 158, 160.

Recommended procedures for study of machinability and evaluation of cutting fluids. (G21)

291-G. New Metal Treating Process Speeds Cold Working, Cold Extrusion of Steel. *Materials & Methods,* v. 34, Aug. 1951, p. 68-69.

Foscoat process, in which a special phosphate coating and organic lubricant combine to give a heat resistant lubricating surface with exceptional adherence under severe working conditions. (G21, ST)

292-G. Increasing Endurance of Magnesium Castings by Surface Work. George H. Found. *Metal Progress,* v. 60, Aug. 1951, p. 51-54.

Possible mechanisms of the improvement in fatigue properties. Conventional shot peening resulted in deterioration rather than strengthening the surface. A practical solution was obtained by a technique involving high forces but without high-velocity impacts. Hardened steel shot, large in diameter, accelerated by gravity while dropping 24-48 ft., was found to work the surface layers intensely to depths of 0.030 in. and more. The surface layers were not cracked. A rubbing or burnishing technique suitable for machined surfaces was also developed. Improvement in fatigue properties and resulting surface structures. (G23, Q7, Mg)

293-G. Drawing Compounds or Lubrication of Metal for Drawing. *Modern Industrial Press,* v. 13, Aug. 1951, p. 6, 8.

Functions and recommendations for selection. (G21)

294-G. The Deep Drawing and Pressing of Non-Ferrous Metals and Alloys. J. Dudley Jevons. *Sheet Metal Industries,* v. 28, Aug. 1951, p. 723-732, 736.

Previously abstracted from *Journal of the Institute of Metals.* See item 137-G, 1951. (G4, Q23, EG-a)

295-G. Hot Forming of Aluminum and Magnesium Alloys. T. E. Piper. *Transactions of American Society for Metals,* v. 43, 1951, p. 1013-1029; disc., p. 1029-1032.

Previously abstracted from *American Society for Metals,* Preprint 36, 1950. See item 319-G, 1950.
(G general, F21, J general, Al, Mg)

296-G. Grindability of Tool Steels. L. P. Tarasov. *Transactions of American Society for Metals,* v. 43, 1951, p. 1144-1168; disc., p. 1168-1174.

Previously abstracted from *American Society for Metals.* Preprint 42, 1950. See item 320-G, 1950.
(G18, J2, Q29, TS)

297-G. Basic Factors in Hot-Machining of Metals. E. J. Krabacher and M. E. Merchant. *Transactions of the American Society of Mechanical Engineers,* v. 73, Aug. 1951, p. 761-769; disc., p. 769-776.

Research on the influence of basic metal-cutting quantities when machining metals at elevated temperatures. Studies on the mechanics of cutting at elevated temperatures were made in which such basic quantities as chip friction, shear strength, and machining constant were measured. In addition, tool-chip interface temperatures were calculated. These data were correlated with data obtained from milling tool-life tests on the same materials. Data are presented for some of the more common high-temperature alloys. (G17, SG-h)

298-G. Cutting Temperatures and Metal-Cutting Phenomena. B. T. Chao and K. J. Trigger. *Transactions of the American Society of Mechanical Engineers,* v. 73, Aug. 1951, p. 777-787, disc., p. 786-793.

Part I pertains to the cutting forces and cutting temperatures observed during conventional turning and orthogonal cutting under identical conditions. Part II considers the role of tool-chip contact area on interface temperatures. Data are limited to NE9445 steel subjected to different heat treatments. (G17, AY)

299-G. Causes of Increase in Durability of Cutting Tools During Electric-Spark Machining. (In Russian) *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser., v. 78, June 1, 1951, p. 673-676.

Mechanical and metallurgical factors responsible for this phenomenon. Results of three series of experiments on effects of different factors, using steel designated 18Kh-NVA, at different hardnesses.
(G17, ST)

300-G. Steel Airscrew Blades. The DeHavilland Composite Construction. Part II. Forming Operations on the Shell; Blade-Assembly and Brazing. Part III. Rubber-Filling and Final Machining Operations. *Aircraft Production,* v. 13, Aug. 1951, p. 234-240; Sept. 1951, p. 268-275.

Equipment and procedures. Metal is alloy steel. (G general, K8, AY)

301-G. Method X "Machines" Carbides by Atom Expulsion. *American Machinist,* v. 95, Sept. 3, 1951, p. 194-195.

The method shapes metallic parts in a dielectric fluid by a spark discharge of controlled intensity and duration. It is used to work such materials as sintered tungsten carbides, S-816, titanium, Vitallium, vanadium, hardened steels, and other such hard-to-machine materials. One of its principal uses is in machining of sintered carbides.
(G general, SG-j)

302-G. Round-Edge Blanks Produced With Rubber Dies. Haim Murro. *American Machinist,* v. 95, Sept. 17, 1951, p. 138.

Method for obtaining the round edge in the die so that ornamental parts do not require a second operation. The finish on the blank edge arises from the types of stresses induced during blanking. The method is especially valuable for short-run and experimental jobs. (G8)

303-G. Hollow Steel Propeller Blades for Aircraft. *Engineering,* v. 172, Aug.

10, 1951, p. 161-163; Aug. 17, 1951, p. 193-194; Aug. 24, 1951, p. 225-226.

Manufacturing process developed by de Havilland Propellers, Ltd., is similar, but not identical to that of United Aircraft Corp. in the U. S. The blade consists of a tapered alloy steel core tube formed to an oval cross-section, an alloy steel sheet-metal covering brazed to the top and bottom surfaces of the core tube, and a light-weight nylon-reinforced filling compound of rubber and synthetic resin. Processes include forming, heat treatment, seam welding, brazing, and machining. (G general, K general, T24, AY)

304-G. The Measurement of Chip Deformation During Turning. W. Leyensetter. *Engineers' Digest,* v. 12, Aug. 1951, p. 251-252, 254.

Translated and condensed from original in *Zeitschrift des Vereines Deutscher Ingenieure.* See item 199-G, 1951. (G17, Q23)

305-G. Standard Presses Form Ribber Sheets. R. B. Scott. *Iron Age,* v. 168, Aug. 30, 1951, p. 75-77.

Use of Al sheet with integral stiffening elements in aircraft. At Lockheed, standard equipment is being used to form the sheet into wing panels. Special techniques in stretch and compression forming were used to overcome some of the problems of forming integrally stiffened sheets. Panels can be formed to precision contours. (G1, Al)

306-G. Stronger Hinges Made Faster From Preformed Bar. W. G. Patton. *Iron Age,* v. 168, Sept. 6, 1951, p. 103-105.

Use of preformed steel bars and inclined conveyors to transfer work from one press to another, plus sound production planning, has made it possible for Soss Mfg. Co. to turn out a record output of hinges for automobile doors. (G1, ST)

307-G. Manufacture of Aluminum Hats. Howard Jackson. *Light Metal Age,* v. 9, Aug. 1951, p. 8-10.

Drawing, riveting, salt-bath heat treating, and anodic finishing of hats for workers in various industries where head protection is desirable. (G4, K13. J2, L19, Al)

308-G. Increasing Productivity in Production Machining. Michael Field and Norman Zlatin. *Magazine of Tooling and Production,* v. 17, Aug. 1951, p. 49-53, 56, 58, 60; Sept. 1951, p. 50-53, 56, 58, 106.

Stresses the importance of using carbide cutting tools. Data are plotted for the speed at which different types of metal can operate. (To be continued.) (G17, C-n, CI)

309-G. Peening Process Increases Fatigue Life of Drill Collars. George J. Gilbert. *Oil and Gas Journal,* v. 50, Sept. 6, 1951, p. 74-75, 106-107.

A new treatment called "Hi-Fled", which involves mechanical peening with an air hammer. (G23, ST)

310-G. Aircraft Parts Stretch-Formed on Conventional Mechanical Presses. B. F. Raynes. *Steel,* v. 129, Aug. 27, 1951, p. 76-77.

Use of a 750-ton Clearing double-action press by Rohr Aircraft Co. (G9)

311-G. Tube Bender Forms Sheet Metal Components. Adolph Kastelowitz. *Steel,* v. 129, Aug. 27, 1951, p. 78-79.

Collars or U-shaped parts having angle, channel, hat, or similar section, are readily produced in a simple setup using only inexpensive plastic tools. (G6)

312-G. Magnesium Alloys Can Be Machined Efficiently. E. A. Parent. *Steel,* v. 129, Sept. 3, 1951, p. 91-92.

Problems in machining Mg alloys. By heeding a few basic design factors and improvising on the job, complications usually encountered can be minimized. (G17, Mg)

313-G. Review of Powder Cutting Process. Part Four. R. E. Dore. *Welding & Metal Fabrication,* v. 19, Aug. 1951, p. 301-307.

Applications of the three processes described in earlier installments. 17 ref. (G22)

314-G. Carbides Are No Expedients; Use Them Properly for Best Results. Ray D. Mack. *Western Machinery and Steel World,* v. 42, Aug. 1951, p. 76-77, 99.

How best results can be obtained from use of carbide tools. (G17, T6, C-n)

315-G. Plate-Edge Preparation; Preparation of Plate for Production Welding and Flame Planing. C. A. Heffernon. *Western Machinery and Steel World,* v. 42, Aug. 1951. p. 80-83.

When plate is prepared for production welding it is desirable to use various types of edge preparation. The type of edge preparation varies with the thickness and type of material, method of welding, type of joint, and angle of adjoining plates. Types of edge preparation which are most frequently encountered are presented. (G22, ST)

316-G. New Matching Techniques Make Available Benefits of New Alloys. L. B. Manlove. *Western Metals,* v. 9, Aug. 1951, p. 31-33.

Experiences with turret-lathe machining of Ni-base alloys containing high percentages of Cr, Mo, and W. Special procedures are necessary because of hardness of the alloys. Also thread rolling. (G17, G12, Ni)

317-G. Development of "Built-up Edges" During Chip Formation. Giuseppe Carro-Cao. (In Italian). *Metallurgia Italiana,* v. 43, July 1951, p. 270-280.

Explained by means of the theory of plastic deformation. (G17)

318-G. Investigation of Force Relations During Drilling. (In Russian.) A. I. Kashirin and F. A. Barbashov. *Stanki i Instrument,* (Machine Tools and Equipment), v. 22, Feb. 1951, p. 1-3.

Formulas are derived for torsional-moment and axial-force increase during steel and cast-iron drilling with hard-alloy drills and drills of high speed toolsteel. Construction of dynamometer used in experimental investigation. (G17, ST, CI)

319-G. Rapid Turning of Heat-Resistant Steels of the Austenitic Class. (In Russian.) A. P. Ivanov. *Stanki i Instrument,* (Machine Tools and Equipment), v. 22, Feb. 1951, p. 3-5.

Experimental investigation of behavior of steels most difficult to machine on lathes equipped with cutting tips of optimum characteristics established that breakdown of cutting edge as a result of chipping is not due to any casual causes, but is fully related to individual factors of cutting conditions. Data relating time, revolutions per minute, depth of cut, and wear, are charted. (G17, ST)

320-G. Increase of Productivity of Machining by Application of Variable Cutting Conditions. (In Russian.) S. E. Esikov. *Stanki i Instrument,* (Machine Tools and Equipment), v. 22, Feb. 1951, p. 19-21.

The problem was investigated experimentally and empirical formulas are developed relating depth of cut, rate of cutting, and time required for a given operation. Cutting conditions for different cases. (G17, ST)

321-G. Analytical Determination of Amount of Heat Evolved From Chips in a Part Being Machined. (In Russian.) A. A. Svakov. *Stanki i Instrument* (Machine Tools and Equipment), v. 22, Feb. 1951, p. 27-28.

Problem was investigated experimentally and a formula devised for its solution, as a first approximation, based on vector analysis. (G17, ST)

322-G. (Book) **Carbide Cutting Tools.** Warren Baker and Joseph S. Kozacka. 416 pages. 1951. American Technical Society, 848 E. 58th St., Chicago 37, Ill. $5.50.

Practical information on carbide tools. Development of tools since the beginning of their history to the eventual conversion to carbides. Wide information about carbides and cutting problems. (G17, C-n)

323-G. (Book) **Machining Magnesium.** 64 pages. 1951. Dow Chemical Co., Midland, Mich.

Opinions, findings, and recommendations, concerning the performance and use of Mg alloys, based on Dow Chemical Co.'s research and experience. Materials and processes. (G17, Mg

324-G. (Book) **Metalworking Machinery Directory. Ed. 2.** Supt. of Documents, U. S. Govt. Printing Office, Washington 25, D. C. $3.50.

A master reference index of approximately 800 machine tool builders and a listing of some 60,000 metalworking machines. Recent changes in corporate structure and plant ownership are indicated. (G17, A6)

325-G. (Book) **Studies on the Machining of Metals.** (In Russian.) N. I. Reznikov. 587 pages. 1947. State Publishing House for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

Contains 350 figures, numerous tabulations, and highly mathematical treatments (more than 600 equations). Majority of the 200 references are citations from Russian literature. (G17)

326-G. Bending and Coiling Tubes of Nickel and High-Nickel Alloy. *Heating and Ventilating,* v. 48, Sept. 1951, p. 78-80.

Various techniques and equipment. (G6, Ni)

327-G. "Koldflo": Cold Extrusion Tamed. *Iron Age,* v. 168, Sept. 20, 1951, p. 74.

Cold extrusion of steel with Mullins Mfg. Corp.'s Koldflo process. Weight and size tolerances can be kept within limits needed for most mass-produced precision parts, and because of the glass-smooth surface possible, machining can be kept at a minimum. (G5, ST).

328-G. Steam Treatment Increases High-Speed Tool Life. Herbert Chase. *Iron Age,* v. 168, Sept. 20, 1951, p. 126-128.

A process developed by International Business Machines. Steam, in a furnace at 1025° F, produces a tightly adherent, hard oxide on cutters, drills, hobs and other tools that avoids or delays the loading causing premature dullness. Pieces per grind have been increased from 45 to over 200%. Down-time for regrinding was substantially reduced. (G17, L14, TS)

329-G. Magnesium Impact Extruded. T. L. Patton. *Iron Age,* v. 168, Sept. 27, 1951, p. 81-85.

How Mg can be impact extruded in round, oblong, or rectangular

shapes, with ribs, flanges, or bosses. Slugs were made from bar, powder, and hot metal. (G5, Mg)

330-G. Honing Hardened Gears Simplifies Production. W. G. Patton. *Iron Age*, v. 168, Sept. 27, 1951, p. 92-93.

To produce necessary accuracy in the internal spline on its high production sliding gears, Warner Gear Div. of Borg-Warner Corp., is finish honing the hardened gears. Adoption of honing has made it possible to eliminate the hard broaching operation, which required that hardness in the spline hole should not exceed Rockwell C-35. (G19)

331-G. Stretch-Forming on a Press Brake. Gilbert C. Close. *Machinery*, (American), v. 58, Sept. 1951, p. 153-155.

A modified 400-ton hydraulic press brake is being used in the shops at Northrop Aircraft, Inc., Hawthorne, Calif., for precision stretch-forming of aluminum skin sections for high-performance military airplanes. (G9, Al)

332-G. Expanded Metals Save Weight and Material. Philip O'Keefe. *Materials & Methods*, v. 34, Sept. 1951, p. 74-77.

Available materials, design characteristics, fabrication, and applications. Fabrication procedures used include shearing, torch cutting, punching, drilling, forming, and arc welding. (G general, K1, T general)

333-G. Hard, Brittle Materials Machined Using Ultrasonic Vibrations. S. G. Kelley. *Materials & Methods*, v. 34, Sept. 1951, p. 92-94.

New process, employing abrasive particles and ultrasonic vibrations, efficiently shapes complicated forms in difficult-to-machine materials. (G17)

334-G. Fabricating Magnesium Alloys. H. W. Perry. *Metal Industry*, v. 79, Sept. 7, 1951, p. 195-199.

Drawing, stretch forming, spinning, joining, and surface finishing. (G4, G9, G13, K general, L general, Mg)

335-G. Fundamentals of the Working of Metals. Part XXVI. Follow-Die Fabricating. George Sachs. *Modern Industrial Press*, v. 13, Sept. 1951, p. 24-26, 34.

Various gang-die methods with emphasis on the follow-die method. Equipment and techniques. (G1)

336-G. Machining Method for Carbides. *Precision Metal Molding*, v. 9, Sept. 1951, p. 67-69, 91.

A means of cutting holes of regular or irregular contour in hard materials such as cemented carbide is called Cavitron and involves the use of ultrasonics. Using a blunt tool of the desired shape, a hole can be cut in any material. (G17, C-n)

337-G. Jet Plane Production Spurs Unique Machines and Methods. Norman Lynn. *Steel*, v. 129, Sept. 24, 1951, p. 98-100.

Pilot lines at Lockheed use radically new types of machines designed to "carve" wing sections from solid metal and to produce many other intricate parts by template-guided tools. (G17)

338-G. Press Clips Produce Wrinkle-Free Stampings. R. B. Stanton. *Steel*, v. 129, Sept. 24, 1951, p. 101-102.

Apparatus and procedure developed by North American Aviation at Los Angeles which make it possible to produce stampings without wrinkle defects. (G3)

339-G. Effects of Light Peening on the Yielding of Steel. N. H. Polakowski. *Welding Journal*, v. 30, Sept. 1951, p. 450s.

Discusses paper by H. L. Harrison and B. D. Mills, Jr. (May 1951, issue; see item 186-G, 1951.) (G23, Q23, ST)

340-G. Now You Can Machine "Green" Carbide Compacts. Henry Swenson. *American Machinist*, v. 95, Oct. 1, 1951, p. 131-133.

Production of carbide cutters with a minimum of labor. Carbide was used for the cutting head only and this was brazed to a high speed steel shank. (G17, C-n, TS)

341-G. Spotwelder Doubles as Hot Upsetter. William E. Finney. *American Machinist*, v. 95, Oct. 1, 1951, p. 134-135.

How hot-upsetting operations on the heel sections of fabricated steel shoes for Wagner automotive and truck hydraulic brakes are performed in National 150-kva. special spot welders with automatic heat and hydraulic ram pressure. (G1, K3, ST)

342-G. U. S. Air Force Machinability Report 1951. *American Machinist*, v. 95, Oct. 1951, p. 161-168.

A review of the second section of a report issued by Curtiss-Wright Corp. on the machining of a wide variety of steels. A flow chart summarizing data in the U. S. Air Force Machinability Report, 1951. Tool life curves show similar structures of 12 steels. (G17, ST, TS)

343-G. Machinability of Titanium 150A. *American Machinist*, v. 95, Oct. 1951, p. 179. (From "U. S. Air Force Machinability Report," Curtiss-Wright Corp., 1951.)

Data in graphical form on carbide tool life. (G17, Ti, C-n)

344-G. Production Rate Chart for AISI 8640. *American Machinist,* v. 95, Oct. 1951, p. 181, 183.

Chart shows the effects of feed and speed on tool life. An alignment chart with directions on its use is also given. (G17, AY)

345-G. Improvement in Production of Multiple Parts by Oxyacetylene Cutting Techniques. Harry S. Swan. *Industry & Welding,* v. 24, Oct. 1951, p. 38, 40-41, 112.

Preparation of parts which will be used for arc-welded fabrication was shown to be most economically accomplished by oxy-acetylene cutting. (G22, ST)

346-G. An Important New Method for Metal Gouging and Cutting. Metal Removal by Carbon Arc. *Industry & Welding,* v. 24, Oct. 1951, p. 60-62, 65-66, 111.

A device, which, combining use of compressed air, ordinary carbon electrodes and a d.c. welding machine, rapidly and accurately removes defective welds, prepares welding grooves and cuts all ferrous and nonferrous metals. (G22)

347-G. Colloidal Graphite Serves as Lubricant in Hot and Cold Forming of Metal. Alden Crankshaw. *Materials and Methods,* v. 34, Oct. 1951, p. 180, 182-183.

Applications and data on how lubrication with colloidal graphite increases cutting tool life. (G21)

348-G. Thermal Distortion, Deflection and Vibration in Machine Tools. Part I. Max Kronenberg. *Modern Machine Shop,* v. 24, Oct. 1951, p. 178-182, 184, 186, 188, 190, 192, 194, 196.

The above three factors affect tool life, surface finish, working accuracy and maintenance of machines. Specific examples with notes on efficient means to reduce these factors. (G17)

349-G. Careful Analysis Can Lower Your Cutoff Costs. H. J. Chamberland. *Steel,* v. 129, Oct. 1, 1951, p. 70-72.

Compares sawband and abrasive-wheel cutting techniques. Both have definite advantages and limitations which must be considered when selecting the most economical and practical method for a plant. (G17, G18)

350-G. Manufacture of Wing Tip Fuel Tanks at Rohr Requires Unusual Forming and Welding Methods. George R. Brolaski. *Western Metals,* v. 9, Sept. 1951, p. 40-41.

Stretch forming, spot welding, heli-arc welding, and final assembly. (G9, K1, K3, Al)

351-G. Processing Magnesium Alloys. H. W. Perry. *Aircraft Production,* v. 13, Oct. 1951, p. 313-316.

Previously abstracted from *Metal Industry.* See item 334-G, 1951. (G4, G9, G13, K general, L general, Mg)

352-G. Fabrication at Maytag. Robert Beane. *Finish,* v. 8, Oct. 1951, p. 21-25, 67.

Equipment and procedures used to produce automatic washing machines. Included are slitting, deep drawing, punching, trimming, stamping, machining, and welding (spot, projection, seam and flash butt). (G general, K3, CN)

353-G. New Air Force Machinability Research Report Issued. *Iron Age,* v. 168, Oct. 11, 1951, p. 110-114.

Reviews 2nd volume of "U. S. Air Force Machinability Report—1951," published by Curtiss-Wright Corp. Expands the microstructure-machinability correlation developed in the first report. Cutting speed vs. tool life charts are given for different microstructures of 12 commonly used steels. Latest information on machining Ti and its alloys, plus selected tabular and graphical data and photomicrographs. (G17, M27, TS, Ti)

354-G. How to Bandsaw Bronzes. H. J. Chamberland. *Iron Age,* v. 168, Oct. 18, 1951, p. 110-112.

Until recent years, bandsawing of bronzes was limited to low speeds, and tool life was poor. New blades, machines, and techniques have improved this situation. The skip-tooth sawband and line grinding with carbide bands are of particular importance in handling Al and Mn bronzes. (G17, Cu)

355-G. Some Problems Encountered in the Use of Soluble Oils. A. W. Lindert. *Lubrication Engineering,* v. 7, Oct. 1951, p. 223-227.

"Soluble" or "emulsifiable" oils are used in many metalworking processes, especially grinding, as coolants, to avoid localized burning, and to prevent undesirable changes in surface properties. However, bluish-black spots frequently develop. This phenomenon was studied and a mechanism postulated to explain it. (G21, ST)

356-G. Forming and Fabricating Seamless Nickel Tubing. *Machinery* (American), v. 57, Aug. 1951, p. 163-168.

Methods recommended by the International Nickel Co. for coiling, bending, threading, expanding, welding, and brazing Ni, and high-Ni alloy, seamless tubing. (G general, K general, Ni)

357-G. How Microstructure of Steel Affects Machinability. *Machinery* (American) v. 58, Oct. 1951, p. 177-179. (A condensation).

The Air Materiel Command of the U. S. Air Force is sponsoring an extensive investigation into the machinability of various metals, headed by Curtiss-Wright Corp. Seven microstructures typical of 12 commonly used steels are shown in a chart, together with curves indicating the tool life that can be expected in machining each type at given cutting speeds. (G17, M27, ST)

358-G. Drilling Cast Iron at 260 Feet per Minute With Carbide Tools. *Machinery* (American), v. 58, Oct. 1951, p. 184-187.

Cast-iron water-pump housings are drilled, reamed, bored, recessed, counterbored, and tapped at the rate of 430 per hr. on automatic, 8-station indexing machines at the Ford Motor Co. The results were accomplished by using carbide tools. (G17, CI)

359-G. Drawing Limits for Rectangular Boxes. Toshisade Ishikawa. *Metal Progress,* v. 60, Oct. 1951, p. 80-82.

Information on limits for cupping rectangular sheets—an operation commonly encountered in production. Confined to a study of the geometric variables involved in drawing rectangular boxes of normal deep-drawing-grade Al sheet. Such variables as metal properties, heat treatment, hold-down pressures, press speed, and lubricant were held constant. (G4, Al)

360-G. Oxygen Cutting. *Metal Progress,* v. 60, Oct. 1951, p. 206, 208, 210. (Translated and condensed from "New Data on the Oxygen Cutting of Steel," F. Pfleiderer, *Journal de la Soudure,* v. 38, 1948, p. 151-160.)

Purpose of the research was to secure a more exact understanding of the nature of oxygen cutting and to understand the origin of drag lines in the hope of improving the smoothness of oxygen-cut surfaces. High speed motion-picture photography was used in the study. (G22)

361-G. Transparent Cutting Oils. J. C. Van Gundy. *Screw Machine Engineering,* v. 12, Oct. 1951, p. 57-61.

Performance data on active-type sulfurized oils. Properties of corrosive and non-corrosive types. Applications. (G21)

362-G. The Deep Drawing and Pressing of Non-Ferrous Metals and Alloys. (Concluded). J. Dudley Jevons. *Sheet Metal Industries,* v. 28, Sept. 1951, p. 815-823, 830; Oct. 1951, p. 915-924, 930.

The inter-stage annealing of deep drawn or pressed parts. Factors causing unsatisfactory annealing. Various tests which yield information concerning deep drawing and pressing properties. Reviews such matters as season cracking, stretcher strain markings, and the behavior of some nonferrous metals under the press. 46 ref.
(G1, G4, J23, EG-a)

363-G. The Fabrication and Welding of Austenitic Stainless Steels. P. L. Pocock. *Sheet Metal Industries,* v. 28, Oct. 1951, p. 933-942, 944.
(G general, K general, SS)

364-G. Ground Surfaces of High Speed Steel Cutting Tools. Vincent O. Stromberg. *Tool Engineer,* v. 27, Oct. 1951, p. 33-35.

How to detect softening and how to minimize its effects by careful grinding techniques so as to increase tool life. (G18, TS)

365-G. Experimental Measurement of Cutting Forces and Speeds. Part I. J. B. Armitage and A. O. Schmidt. *Tool Engineer,* v. 27, Oct. 1951, p. 36-40.

A summary of power and force measurements in metal-cutting experiments conducted and reported within the last 50 yrs. in various countries. Results are presented as much as possible in the same terms and units of measurement. Diagrams represent the various findings and theories of many experimenters. (To be continued.) (G17)

366-G. Super-Finishing Bronze and Brass. V. K. Nikitin. *Industrial Diamond Review,* new ser., v. 11, Mar. 1951, p. 73-74. [Translated from *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Sept. 1949, p. 16-17.]

Superfinishing has hitherto been limited mainly to iron and steel. Experiments were made to ascertain the possibilities of superfinishing surfaces of softer metals. (G19, Cu)

367-G. Machining Metals at High Temperatures. J. Lomas. *Machinery Lloyd* (Overseas Ed.), v. 23, Sept. 29, 1951, p.80-81, 83.
(G17)

368-G. Cash Boxes Press Engineered. Howard E. Jackson. *Modern Industrial Press,* v. 13, Oct. 1951, p. 13-14, 16, 22.

Procedures and equipment for manufacture of cash boxes. Press operations, spot welding, cleaning, and finishing. Material is cold-rolled steel. (G1, K3, L general, CN)

369-G. Cutting Carbides in a Brand-New Way. *Modern Industry,* v. 22, Oct. 15, 1951, p. 101.

New "electromechanical" process for working materials like tungsten and boron carbides, zirconium boride, and alloys used to make jet-engine turbine blades. The method

"cuts" by means of an accurately controlled spark discharge, but it does not melt the metal. As a matter of fact, the work and tool (electrode) hardly heat up at all. Rather, the metal is dispersed as a cloud of fine particles. (G17, C-n, SG-j)

370-G. Titanium Machines Like Jet-Engine Alloys. *Steel,* v. 129, Oct. 22, 1951, p. 74-77.

Based on concluding section of Air Force machinability report just published by Curtiss-Wright. Summarizes machinability data obtained by several cooperating organizations. (G17, Ti)

371-G. Maintenance and Improvement of Quality Cold Heading Wire. Lester R. Franks and John C. Harrigan. *Wire and Wire Products,* v. 26, Oct. 1951, p. 888-891, 894-895, 898, 998.

Recommended procedures. Several simple rules for successful application of the cold heading process are clarified by schematic diagrams. Macrostructures of properly and improperly headed bolts. Grades of carbon steel used for the different types of products. Typical products. (G10, T7, CN)

372-G. Tungsten and Molybdenum as High Speed Steel Tool Materials. Part 2. Molybdenum, Tungsten/Molybdenum and Cast Chromium Tungsten High Speed Steels. K. J. B. Wolfe. *Alloy Metals Review,* v. 8, Sept. 1951, p. 2-7.

Salient qualities of the straight Mo, the W-Mo and the cast Cr-W high-speed steels. Heat treatment recommendations. Appraisal of the first two types of steels was attempted by the use of drilling tests while milling tests were used to evaluate the cutting properties of the cast Cr-W types. (G17, J general, T6, TS)

373-G. How to Machine Copper Alloys. Lester F. Spencer. *American Machinist,* v. 95, Oct. 29, 1951, p. 109-123.

Special report divides the various alloys into three major groups, according to their machinability ratings. Specific recommendations for each group. Feeds, speeds and tool cutting angles for the common machine operations. Typical uses. (G17, Cu)

374-G. How Douglas Stretch-Forms Titanium. *American Machinist,* v. 95, Oct. 29, 1951, p. 124. (Condensed from paper by O. A. Wheelon.)

Process as applied to a new project at Douglas Aircraft Co. Weight was extremely critical and titanium, despite its high cost, was the most economical method for saving approximately 5% of the total structural weight. Recommended stretch-forming procedures. (G9, Ti)

375-G. Powder Processes Give New Tools to Industry. A. B. Kinzel, D. Swan, H. Biers, and H. R. Pufahl. *Canadian Metals,* v. 14, Oct. 1951, p. 10-12, 14.

Powder process for cutting nonferrous metals, cast iron, and refractory materials; and for reclamation of castings. (G22, EG-a, CI)

376-G. Deep Drawing of Aluminum. L. W. Lengbridge. *Canadian Metals,* v. 14, Oct. 1951, p. 52-54, 56, 58.

Various processes used. Factors which play a part in drawing operations. (G4, Al)

377-G. High Temperature — High Pressure Piping. W. S. Woolsey. *Heating, Piping & Air Conditioning,* v. 23, Nov. 1951, p. 77-81.

Fabrication of a heavy-wall, 2¼% Cr, 1% Mo pipe. Welding procedures and methods of stress relieving. (G6, K general, J1, AY)

378-G. A New Method of Machining. John S. Roller. *Iron and Steel Engineer,* v. 28, Oct. 1951, p. 133, 135.

A new method which employs the direct utilization of electrical energy for the machining of any electrically conductive material. The method (known as "Method X") in a directed manner by means of an electric spark discharge which does not otherwise affect the work material's physical or chemical characteristics. (G17)

379-G. Bearings, Lubricants, and Lubrication; A Digest of 1950 Literature. *Mechanical Engineering,* v. 73, Nov. 1951, p. 892-896.

A literature survey. The role of lubrication in grinding metals is included. Frictional wear of metals. 72 ref. (G18, Q9)

380-G. Thermal Distortion, Deflection and Vibration in Machine Tools. Part II. Max Kronenberg. *Modern Machine Shop,* v. 24, Nov. 1951, p. 122-124, 126, 129-130, 132, 134, 136.

Differentiates between lateral and torsional vibrations. Forced and self-excited vibrations with emphasis on an analysis of their sources and causes. (G17)

381-G. Powder Cutting Handles Stainless With Ease. *Steel,* v. 129, Nov. 5, 1951, p. 94-96.

Problem of fluxing and removing the refractory oxide formed in cutting Cr-bearing steels is solved by adding Fe powder to the oxygen atmosphere. Other applications of powder cutting are in nonferrous metals, cast iron, and carbon steel. (G22, SS)

382-G. What to Do About Wrinkled Stampings; Clips Improve Guerin Process. Thomas A. Dickinson. *Steel Processing,* v. 37, Oct. 1951, p. 499-500, 533.

Procedures followed by North American Aviation. Diagrams show set-ups using sheetmetal clips to equalize forming pressures. (G8)

383-G. Mullins Develops New Cold Extrusion Process. *Steel Processing,* v. 37, Oct. 1951, p. 505, 519.

The process called Koldflo will coin, extrude forward and backward, compress, expand, and iron. (G5, ST)

384-G. Comparison of Progressive and Single-Station Dies. R. J. Schimpf. *Tool Engineer,* v. 27, Nov. 1951, p. 33-35.

Advantages and disadvantages. Discussion is limited to production of rotor and stator laminations for a ¼-hp motor. (G2)

385-G. Experimental Measurement of Cutting Forces and Speeds. Part II. J. B. Armitage and A. O. Schmidt. *Tool Engineer,* v. 27, Nov. 1951, p. 50-54.

There is no single, definite value of cutting speed and feed for a particular material. Experimental investigations on cutting low-alloy steel with carbide tools develops principles that are generally applicable. 24 ref. (G17)

386-G. The Technological Mechanics of Deep Drawing. (In German.) Hans Kostron. *Archiv für das Eisenhüttenwesen,* v. 22, July-Aug. 1951, p. 205-213.

Mathematical treatise dealing with the geometry of the deep-drawing process; computing local deformations; the flow curve; flow conditions; computing contracting stresses; spatial state of stress in deep drawing; the law of form change; limiting drawing conditions; and premature contraction. (G4)

387-G. Research on a New Hot Deep-Drawing Process. (In German.) Dieter Lenz. *Archiv für das Eisenhüttenwesen,* v. 22, July-Aug. 1951, p. 215-224.

Process for cupping of round sheet-metal discs. Optimum drawing conditions were investigated experimentally for a 99.5% Al and a series of Al alloys. Photographs of equipment, dies, and products. (G4, Al)

388-G. Powder Flame Cutting. (In German.) L. Wolfe. *Schweissen und Schneiden,* v. 3, Aug. 1951, p. 256-260.

Equipment used with iron powder. Several examples show that the process can be used where the oxygen flame cutting process fails. It is applied, especially, to the cutting of stainless steels, cast iron, and pieces of steel and iron that contain slag and cavities. (G22, SS, CI)

389-G. The Problem of Internal Stresses Due to Cold Working and Their Reduction. (In German.) H. Bühler. *Zeitschrift des Vereines Deutsche Ingenieur,* v. 93, Oct. 11, 1951, p. 932-933.

Literature reviewed shows that "redrawing" reduces internal stress 70-90%. 24 ref. (G4, Q25)

390-G. Relationship of Efficiency of Liquid Media During Free Surface Grinding and the Physicochemical Nature of the Medium and the Metal. (In Russian.) N. A. Pleteneva and G. I. Epifanov. *Doklady Akademii Nauk SSSR,* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 21, 1951, p. 1051-1053.

Effectiveness of water, hydrocarbons and their chloro-substitutes, alcohols, acids, and complex esters of the aliphatic series on surface grinding of plastic metals, (Al, Cu, Fe, Ni, Pb, Sn, stainless steel, and high-temperature alloys.) (G18)

391-G. Metallurgical Considerations in Machining. I. What Underlies Tool Life and Finish? II. Work and Tool Materials Have Definite Properties. III. Physical Characteristics of Cast Alloys and Carbides. IV. Tool Wear Results From Several Causes. Milton C. Shaw and Prescott A. Smith. *American Machinist,* v. 95, Aug. 20, 1951, p. 89-92; Sept. 17, 1951, p. 139-142; Oct. 15, 1951, p. 130-132; Oct. 29, 1951, p. 100-103.

Part I: The relationship between tool life and finish and microstructure of ferrous metals. Effect of heat treatment on microstructure. Part II: Structures produced by different quenching methods, properties of steels and irons, effects of alloying constituents, and properties of ferrous tool materials. Part III: The Co-base cutting tools, the cemented carbides and their microstructure, and the diamond tools. Part IV: Causes of tool wear which include fusion because of temperature and pressure, lapping action of hard particles in the work material, and cutting speed. (To be concluded.)
(G17, Q general, Q9, M27, TS, ST, C-n)

392-G. The Reliability of Metal Cutting Data. L. V. Colwell. *American Society of Mechanical Engineers,* Paper 51-SA-28, 1951, 12 pages.

Several types of metal-cutting data and information, particularly relative machinability ratings, are questioned as to their reliability for certain applications. Failure of machinability ratings to predict performance. The nature of machinability, and a new three-part program for the accumulation of new and more useful data. (G17)

393-G. The Drilling of Cast Iron With Cemented Carbide-Tipped Drills. E. J. Weller and F. W. Lucht. *American Society of Mechanical Engineers,* Paper 51-SA-35, 1951, 16 pages.

Test data show that more efficient

conditions, in so far as horsepower consumption is concerned, are obtained when the drills are operated at the greatest feed per revolution compatible with the limiting factors of the part being machined, the jigs and fixtures used, and the machine-tool equipment available. (G17, T5, CI, C-n)

394-G. Machining Problems With Titanium Alloys. *Automotive Industries,* v. 105, Nov. 1, 1951, p. 46-47, 102. (Extracted from one chapter of "USAF Machinability Report, Vol. 2", 1951, Curtiss-Wright Corp., Wood-Ridge, N. J.)

Turning, milling, cut-off operations, drilling, and tapping. Comparative physical and mechanical properties of three Ti alloys, 24S-T Al, four carbon and low-alloy steels, and five high-temperature alloys are tabulated. (G17, P general, Q general, Ti, Al, CN, AY, SG-b)

395-G. Douglas Experience in Working Titanium. O. A. Wheelon. *Machinery* (American) v. 58, Nov. 1951, p. 137-143.

Miscellaneous secondary fabrication equipment and procedures developed as a result of research at Douglas Aircraft Co. (G general, Ti)

396-G. Carbide Tooling Reduces Costs in a Brass Mill. Paul S. Schubert. *Machinery* (American) v. 58, Nov. 1951, p. 174-178.

Carbide is extensively used for wear resistant applications, as well as for cutting tools and dies, at Bridgeport Brass Co. These and other uses of carbide under a system of coordinated carbide control. (G17, T6, Cu, C-n)

397-G. A Revolutionary New Method of "Machining" Hard Metals. John S. Roller. *Machinery* (American) v. 58, Nov. 1951, p. 180-181.

See abstract of "A New Method of Machining," *Iron and Steel Engineer,* item 378-G, 1951. (G17)

398-G. Increasing Productivity in Producton Machining. Part 3. Michael Field and Norman Zlatin. *Magazine of Tooling and Production,* v. 17, Nov. 1951, p. 64, 118, 158, 162, 166, 170.

Relative machining and mechanical properties of ductile and gray irons are compared. Machining of wrought SAE 8640 steels. (G17, Q general, CI, AY)

399-G. Machine-Cutting in the Forge. L. Hodges. *Transactions of the Institute of Welding,* v. 14, Aug. 1951, p. 145-148.

Various examples show how flame cutting can be combined with forging in many cases to produce better results than are obtainable by either process alone. (G22, F22, ST)

400-G. Aluminium Sheathed Cable. P. M. Hollingsworth. *Colliery Guardian,* v. 183, Oct. 18, 1951, p. 437-441. (A condensation.)

Tube-sinking method developed for sheathing. Properties, installation methods, and related topics. (T7, Al)

401-G. Flame Cutting With Propane. (Continued.) (In French and German.) H. Schulz. *Zeitschrift für Schweisstechnik; Journal de la Soudure;* v. 41, July 1951, p. 125-130; Aug. 1951, p. 141-146.

Preliminary tests made to establish optimum cutting conditions, and equipment and procedure. Graphs and tables show effect of sheet-metal thickness on cutting time and on consumption of fuels. (G22)

402-G. (Book) **The Action of Cutting Tools.** A. J. Chisholm, J. M. Lickley, and J. P. Brown. 88 pages. Machinery Publishing Co., Ltd., National House, West St., Brighton 1, England. 3s., 6d.

Surface finish, forces on tools, tool wear, and machine vibration; how some of the principles presented are applied to practical cutting tools. The economics of machining, and machine-shop investigations designed to promote productivity. (G17, Q9, TS)

403-G. (Book) **Press Tool Practice. Part IV.** P. S. Houghton. 257 pages. Chapman & Hall, Ltd., 37 Essex St., London W. C. 2, England. 21s.

Examples of presswork production, ranging from containers for toilet preparations, ferrules, and umbrella parts, to domestic tinware and art hollow-ware to be plated with precious metals. Some instrument, automobile, and aircraft parts are also included. Tool designs for such products. The hot working of Mg alloys, definitions of press-working terms, and calculation of blank diameters and bending allowances. (G1)

SECTION H

POWDER METALLURGY

1-H. Report on Powder Metallurgy. Thomas A. Dickinson. *Steel Processing,* v. 36, Dec. 1950, p. 619-621.

Brief survey, with emphasis on process equipment and applications. (H general)

2-H. The Production of Uranium and Thorium in Powder Form. P. Chiotti and B. A. Rogers. *U. S. Atomic Energy Commission,* AECD-2974, May 25, 1950, 21 pages. (UF767 U3a)

Method used at the Ames Laboratory. The conversion to the powder form is simple, and may be done with ordinary laboratory equipment in a short time. (H10, U, Th)

3-H. The "Retractometer", an Apparatus for Study of Sintering and of Reactions in the Solid State. (In French.) Stéphane Tacvorian and Maurice Lévecque. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Oct. 16, 1950, p. 772-774.

Apparatus is particularly applicable to determination of volumetric variations during sintering. A series of examples show the variety of possible applications. (H15, P10)

4-H. Make It in Powdered Metal. *Canadian Metals,* v. 13, Dec. 1950, p. 12-13, 48.

Advantages and applicability of powder metal process. (H general)

5-H. Sintering of Iron. (In French.) M. Eudier. *Revue de Métallurgie,* v. 47, Nov. 1950, p. 825-834.

The powder metallurgy of pure iron. Investigations of sintering methods and effects of various factors. (H15, Fe)

6-H. Mechanical Properties of Stainless Steel Powder. Arthur H. Grobe and George A. Roberts. *Journal of Metals,* v. 191, Feb. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 125-130.

Tensile, hardness and density of a new 18-8 stainless-steel powder were determined for the −50, −100, and −140 mesh cuts and also for a prepared blend containing 62% −325 mesh powder. The data were obtained for sintering temperatures of 2100-2350° F. and for compacting pressures of 30-50 tons per sq. in. (H11, Q27, Q29, SS)

7-H. Some Design Aspects of Metal-Powder Parts. D. C. Bradley. *Mechanical Engineering,* v. 73, Feb. 1951, p. 123-127.

Methods used for production of metal powders and for their fabrication into desired parts. Physical and mechanical properties of the parts and principles of design. Typical applications. (H general, T7)

8-H. Experimental Study on the Kinetics of Sintering of Metal Powder at Constant Temperature. I. (In English.) Tosihiko Okamura, Yosimichi Masuda, and Sadao Kikuta. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Dec. 1949, p. 357-363.

Isothermal changes of breaking strength and shrinkage of sintered metals were measured for Cu and Fe at various temperatures keeping other conditions constant. From the experimental results, some empirical formulas for rate of sintering were derived as a function of time and temperature with respect to porosity of the sintered metal. Activation energies for sintering of the metal powders studied are estimated from temperature dependence of rate of shrinkage. 23 ref. (H15, P13, Cu, Fe)

9-H. Hot Pressing Produces High-Strength Carbides. *Tool & Die Journal,* v. 16, Feb. 1951, p. 72-73, 100, 106.

The procedure, its advantages and applications. Instead of cold compaction followed by a subsequent

sintering operation, the mixture of WC and Co particles is poured into the cavity of a special graphite mold where the powder mass, while being heated to a temperature of about 2600° F, is compressed in a special pressure-temperature-time controlled operation. (To be continued.) (H14, C-n)

10-H. The Practicability of Powder Metallurgy. Samuel Bradbury, III. *Electrical Manufacturing,* v. 47, Feb. 1951, p. 84-89, 226, 228.

Powder metallurgy techniques often lend themselves to economical production, particularly where machined parts require assembly. Table of cost factors for six methods for making custom metal parts, and table of physical properties of some common powdered-metal alloys. Typical case histories. (H general, T7)

11-H. Rolling of Strip From Iron Powder. G. Naeser and F. Zirm. *Engineers' Digest,* v. 12, Jan. 1951, p. 17-20. Translated and condensed.) **Steel Strip Experimentally Rolled From Powder.** Gerhard Naeser and Franz Zirm. *Iron Age,* v. 167, Feb. 1, 1951, p. 110-114; Feb. 15, 1951, p. 95-99.

Previously abstracted from *Stahl und Eisen.* See item 104-H, 1950. (H14, Fe)

12-H. Powder Metallurgy Can Help Conserve Critical Metals. A. J. Langhammer. *Materials & Methods,* v. 33, Feb. 1951, p. 134, 136, 138, 140.

Applications which promote conservation. (H general)

13-H. Porous Metals in Engineering. H. W. Greenwood. *Machinery Lloyd* (Overseas Edition), v. 23, Feb. 17, 1951, p. 83, 85-87.

The infiltration or impregnation of a sintered-metal skeleton to obtain a nonporous compact or part points out resultant advantages in increased tensile strength, accuracy, high refractoriness, resistance to creep, and the lowest possible density. (H16)

14-H. Metal Ceramics or Powder Metallurgy. (In French.) M, Oswald. "Les hautes Températures et leurs Utilisations en Chimie, Vol. II" (Masson et Cie., Paris), 1950, p. 1206-1217.

A short review on the basis of the literature. Emphasizes method of production, properties of finished products, and fields of application. 23 ref. (H general)

15-H. Hot Pressing Produces High-Strength Carbides. (Continued). John L. Ellis. *Tool & Die Journal,* v. 16, Mar. 1951, p. 64, 68, 122-124.

Achievement of higher dimensional accuracies, application to large-sized dies, hot-pressing special shapes, manufacturing advantages, die finishing operations, design limitations, heating methods, pressure ranges, and the time element. (H14, C-n)

16-H. Infiltrated Iron and Steel. H. W. Greenwood. *Iron and Steel,* v. 24, Mar. 1951, p. 97-98.

Recent improvements in physical and mechanical properties of parts, in which a skeleton of iron or steel is impregnated with a low-melting-point metal. Present and potential applications. (H16, Fe, ST)

17-H. Influence of Oxide on the Pressing and Sintering of Copper Compacts. T. P. Hoar and J. M. Butler. *Journal of the Institute of Metals,* v. 78, Dec. 1950, p. 351-392.

Pressing and sintering of compacts of electrolytic Cu powder were studied with particular reference to influence of oxide. A single batch of powder was prepared, freed of oxide by hydrogen reduction and superficially oxidized to various oxygen contents ranging from 0.11 to 11.2% by controlled low-temperature treatment in oxygen. Small cylindrical compacts were pressed at 10, 20, and 30 tons per sq. in.; their densities were determined in the green state and after sintering, and their length changes during controlled heat treatment in reducing and neutral atmospheres were followed dilatometrically. (H15, H16, Cu)

18-H. The Compressibility of Iron Powder. J. Heuberger. *Engineers' Digest,* v. 12, Mar. 1951, p. 89-90. (Condensed from *Acta Polytechnica,* No. 98, 1950, p. 11-20.)

A rational formula for the relationship between die pressure and density of the compressed powder is developed, compared with existing formulas, and tested by evaluation of experimental data. (H11, Fe)

19-H. Shell Rotating Bands Successfully Made From Iron Powders. H. R. Clauser. *Materials & Methods,* v. 33, Apr. 1951, p. 61-65.

Manufacturing process. Large-scale adoption of Fe powder rotating bands is now a definite possibility and will make possible large savings of critically short copper. (H general, T2, Fe)

20-H. Particle Agglomeration in Tungsten Metal Powder. Bernard Kopelman and C. C. Gregg. *Journal of Physical & Colloid Chemistry,* v. 55, Apr. 1951, p. 557-563.

Aggregates seen in the microscope, after tungsten powder has been carefully dispersed with a spatula, are clusters of sintered particles. These clusters may be assumed equivalent to single particles of the same diameter. (H11, W)

21-H. Electrodeposition of Copper Powder. M. V. Joshi, H. J. Modi, and G. S. Tendolkar. *Journal of Scientific and Industrial Research,* v. 10B, Feb. 1951, p. 48-49.

Modified cell and auxiliary apparatus. Operating data and results. (H10, Cu)

22-H. Graphical Representation of Properties of Sintered Materials by Means of a General System of Coordinates Related to the Fully Dense Material. Gustav F. Hüttig. *Powder Metallurgy Bulletin,* v. 6, Apr. 1951, p. 7-12.

Density, electric conductivity, elasticity, magnetic saturation, and residual induction of Cu, Fe, Mo, Ni, and W. Includes tensile strength data for Ni. (H11, Cu, Fe, Mo, Ni, W)

23-H. The Effect of the Pore Volume of Sintered Materials on the Magnetic Characteristics. K. Torkar. *Powder Metallurgy Bulletin,* v. 6, Apr. 1951, p. 13-17.

For pure iron. (H11, Fe)

24-H. Production of Tungsten Alloys of High Density by the Infiltration Process. R. Palme. *Powder Metallurgy Bulletin,* v. 6, Apr. 1951, p. 32-34.

A new method of producing tungsten-heavy-metal alloys by infiltration of W skeletons with a eutectic W-Ni alloy. Composite alloys of density 17.5-18.1 g. per cc. and good machinability can be obtained. (H16, W)

25-H. Tungsten-Reinforced Superalloys. Claus G. Goetzel. *Powder Metallurgy Bulletin,* v. 6, Apr. 1951, p. 35-40.

Infiltration of skeletons of W and W-Cr alloys with the Ni-base alloy Nichrome-V and Hastelloy-C and some Co-base alloys. Surface-impregnation treatments were applied to some of the resultant composite bodies. (H16, W, Ni)

26-H. The Formation of Metal From Its Compounds During Sintering. Henry H. Hausner. *Powder Metallurgy Bulletin,* v. 6, Apr. 1951, p. 41-43.

Advantages of using Zr hydride powder for powder metallurgy sintering processes, over the use of Zr powder. (H15, Zr)

27-H. An Investigation of the Effect of Final Density of Copper Infiltrated Iron on Physical Properties. George Stern. *Powder Metallurgy Bulletin,* v. 6, Apr. 1951, p. 57-62.

Study to determine the effect of complete and incomplete infiltration in bodies having various uniform Fe-skeleton densities. (H16, H11, Fe)

28-H. ZrC-Cb Cermals. *Metal Progress,* v. 59, Apr. 1951, p. 548, 550. (Condensed from "Sintering Mechanism Between Zirconium Carbide and Columbium", H. J. Hamjian and W. G. Lidman.

Previously abstracted from *National Advisory Committee for Aeronautics,* Technical Note 2198. See item 88-H. 1950. (H15, C-n, Zr, Cb)

29-H. Unconventional Methods in Powder Metallurgy. *Metal Progress,* v. 59, Apr. 1951, p. 550, 552. (Translated and condensed from "Some New Methods of Powder Metallurgy", G. Wassermann.)

Previously abstracted from *Metallforschung.* See item 5a-47, 1947. (H14)

30-H. Rolling of Powder Metals. *Metal Progress,* v. 59, Apr. 1951, p. 586 (Translated and condensed from "Rolling of Strips From Iron Powder", Gerhard Naeser and Franz Zirm.

Previously abstracted from *Stahl und Eisen.* See items 104-H, 1950, and 11-H, 1951. (H14, Fe)

31-H. Pickle Liquor May Yield Cheaper Fe Powder. *Iron Age,* v. 167, May 3, 1951, p. 112.

Process involves extraction of Fe powder from waste pickle liquor and scrap Al. At present, indications are that the price may run substantially less than imported sponge iron. (H10, A8, Fe)

32-H. Fundamental Problems of Sintering Processes. W. E. Kingston and G. F. Huettig. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 1-25; disc. p. 25-26.

Thermodynamics and thermochemistry; methods of atom movement or transport; kinetics of sintering; present status of theory and suggestions for future effort. 26 ref. (H15, P12)

33-H. Surface Tension as a Motivation for Sintering. Conyers Herring. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 143-178; disc. p. 178-179.

Chemical potentials for a pure substance; relation of the chemical potentials to diffusion; relation of the chemical potentials to vapor pressure and evaporation; chemical potentials beneath a smoothly curved surface; chemical potentials beneath a faceted surface; interfacial equilibria at grain boundaries; chemical potentials at grain boundaries; and relation of surface stresses to dislocations and plastic flow. 17 ref. (H15, P10, Q24)

34-H. Relationship Between Properties and Structure of Sintered Material Made Up of a Single Atom Type. G. F. Huettig, K. Adlassnig, and O. Foglar. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 180-188.

Theoretical discussion followed by an outline of some experimental work on Cu, Mo, and W powders. These were sintered and their density, electrical conductivity, sonic propagation velocity, and modulus of elasticity determined.
(H15, M27, P10, P15, Q21, Cu, Mo, W)

35-H. Shrinkage of Synthetic Pores in Copper. A. W. Postlethwaite. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 189-200; disc. p. 200-201.

States of aggregation through which powdered-metal compacts pass in their progress toward equilibrium; and nature of the changes in cylindrical pores in Cu. Experiments in which cylindrical pores are formed within relatively large masses of pure Cu, and changes in radius and volume of these pores are measured after long periods of heating *in vacuo* at elevated temperatures. Procedure and results obtained. 14 ref. (H15, Cu)

36-H. Theoretical Aspects of Sintering of Carbides. Richard Kieffer. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 278-291; disc. p. 292-294.

Correlates and discusses the literature. Effects of sintering conditions and compositions on physical and mechanical properties. Includes phase diagrams. 10 ref.
(H15, M24, C-n)

37-H. Sintering of Cu-Au Alloys. Pol Duwez and Charles B. Jordon. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 230-236; disc. p. 236-237.

When a compact consisting of a mixture of two metal powders is sintered, the ultimate formation of a homogeneous alloy is the result of a diffusion process. Excluding the possibility of formation of a liquid phase during sintering, two cases may be considered: the two metals form a continuous series of solid solutions at all temperatures, and the two metals are only partially soluble and form intermediate phases or definite compounds. Shows that Cu-Au alloys belong to the second class. (H15, N1, Cu, Au)

38-H. Sintering With a Liquid Phase. F. V. Lenel. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 238-253; disc. p. 253-255.

As a typical example, compacts of 80% Fe + 20% Cu were studied at a sintering temperature of 1120° C., except for a few tests at 1200° C. Compacts made from different particle-size ranges and different grades of Fe powder were sintered for increasing times, and changes in density and microstructure being measured. (H15, Fe)

39-H. Principles and Present Status of Hot Pressing. Claus G. Goetzel. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 256-276; disc. p. 276-277.

Hot pressing has achieved complete densification of parts from many metals: Cu, Au, brasses, bronzes, Fe, steels, and cemented carbides. Tabular and graphical data and photomicrographs. Unsolved problems. 11 ref. (H14)

40-H. Experimental Production of Pure Titanium Carbide Powder by Means of Carbonizing Gases. Volmer Fattinger. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 295-301; disc. p. 301-302.

Five different methods, particularly one developed in which H_2 and $CHCl_3$ pass through a carbon filter and then react with TiO_2 pellets to produce a carbide saturated with carbon. (H10, Ti, C-n)

41-H. Nature of Metal Powders Prepared by Reduction of Oxides. Bernard Kopelman. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 303-309; disc. p. 309-310.

Work confined essentially to tungsten powder and its oxides.
(H10, W)

42-H. Particle-Size Distribution of Tungsten and Molybdenum Powders. A. D. Power and I. M. Kakascik. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 311-318. disc. p. 318-319.

In connection with the manufacture of electron tubes, cathode heater wire is made by alloying powdered W and Mo. Efforts made to find methods of classifying the powders to distinguish those satisfactory for wire making. Preliminary measurements made from elctron micrographs to determine size distribution indicated that this might be useful. Methods devised, work done, and results obtained in determining and using particle-size distribution.
(H11, W, Mo)

43-H. Electrical Properties as Indications of the Degree of Sintering. Henry H. Hausner and John H. Dedrick. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 320-340; disc. p. 341-343.

Sintered materials as electrical networks; electrical resistivity-density correlation as a function of degree of sintering; correlation between electrical resistivity and pressure in the green compact; and temperature coefficient of resistance of sintered materials. 17 ref. (H15, P15)

44-H. Fundamentals of Pressing of Metal Powders. R. P. Sellig. "The Physics of Powder Metallurgy", Ed. 1

(McGraw-Hill, New York), 1951, p. 344-370; disc. p. 370-371.

Behavior of metal powders under pressure and properties of the compact after ejection. Published data on the effect of certain conditions, and original experiments carried out where new evidence was needed for the understanding of pressing phenomena. 18 ref. (H14)

45-H. Alloy Powder Products From Fully Alloyed Powders. G. J. Comstock and J. D. Shaw. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 372-386; disc. p. 386-387.

Development of methods for production of ferrous and nonferrous alloys in powder form, and production of sintered parts from them. (H10)

46-H. Mechanisms of the Sintering of Metal Powders. (In German.) W. Dawihl. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, Mar. 1951, p. 91-96.

Critical illustrated review of studies of powder-metallurgy reactions under different temperatures and pressures indicates that, under certain conditions, sintering of two metal surfaces results in an intermediate layer that is stronger than the metals themselves. Formation of this layer is promoted and accelerated by certain foreign substances and its effect increases as grain sizes decrease, indicating the possibility of producing sintered parts that are stronger than cast ones. 22 ref. (H15)

47-H. Powdered Metals May Answer High Temperature Problem. *Product Engineering,* v. 22, May 1951, p. 123.

With perfection of a technique for infiltrating Fe powder with Cu-alloy, it is now possible to mass-produce jet-engine blades having a yield strength of 90,000 psi. These pressings are able to withstand 3-4 times as much vibration as type 403 stainless and 4 times as much as carbon-steel blades. (H16)

48-H. Production of Metal Powders. (In German.) R. E. Fischer. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Apr. 1951, p. 159-161.

Various methods of pulverizing metals for use in powder metallurgy. (H10)

49-H. (Book) **The Physics of Powder Metallurgy.** Ed. 1. Walter E. Kingston, editor. 404 pages. 1951. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18. $8.50.

Consists of 22 papers and accompanying discussion presented at Bayside, L. I., New York, Aug. 24-26, 1949. Individual papers are abstracted separately. (H general, N general)

50-H. Sintering of Synthetic Latex Particles. R. E. Dillon, L. A. Matheson, and E. B. Bradford. *Journal of Colloid Science,* v. 6, Apr. 1951, p. 108-117.

Recent developments in the use of synthetic lattices in the paint, paper, and textile industries have focused attention upon the mechanism by which polymer particles, at comparatively low temperatures, are welded together into a coherent film. Results may be qualitatively applied in the field of powder metallurgy. (H15)

51-H. Use of Fusible Cores When Producing Components by Powder Metallurgy. *Machinery* (London), v. 78, May 10, 1951, p. 775-776.

New development described in a recent German patent applied for by Michigan Powdered Metal Products Co., Northville, Mich. (H14)

52-H. Identification of Reactions in the Sintering of Compacted Binary Metal-Powder Mixtures by Measuring Their Linear Thermal Expansions. (In German.) Ernst Raub and Werner Plate. *Zeitschrift für Metallkunde,* v. 42, Mar. 1951, p. 76-82.

Sudden expansion, which may exceed 50% of the original length, indicates formation of intermediate phases, often at relatively low temperatures. Experiments with several different alloys show suitability of expansion measurement for study of reactions occurring during sintering of metal powders. (H15)

53-H. Report of Committee B-9 on Metal Powders and Metal Powder Products. W. A. Reich, chairman. *American Society for Testing Materials,* Preprint 14, 1951, 5 pages.

Includes proposed tentative specifications for sintered-metal-powder structural parts from bronze. (H general, S22, Cu)

54-H. The Manufacture of Cemented Tungsten Carbide. B. E. Berry. *Murex Limited Review,* v. 1, No. 8, 1951, p. 165-183.

Begins with concentration of wolfram and scheelite for production of tungstic acid. Succeeding steps are: production of W powder by reduction of the acid; production of W carbide by hot ball milling with carbon powder; alloying with TiC (in some cases); alloying with Co powder; pressing and shaping; sintering; hot pressing; and fitting the carbide cutting inserts into tools of various kinds. (H general, W, C-n)

55-H. A Process for Production of Phosphorus-Copper Alloys. (In German.) E. R. Thews. *Metall,* v. 5, May 1951, p. 198-201.

Critically evaluates older and more modern methods for production of Cu-P alloys containing 14-15% Cu. Experimentally substantiates the possibility of producing these alloys by powder-metallurgy methods. (H general, E general, Cu)

56-H. High-Temperature and Scale-Resistant Sintered Materials. (In German.) Richard Kieffer and Friedrich Benesovsky. *Zeitschrift für Metallkunde,* v. 42, Apr. 1951, p. 97-106.

Review of literature shows that powder metallurgy is an increasingly used method of producing high-temperature-resistant metallic, semi-metallic, and nonmetallic materials and castings. Advances in the field of high-temperature materials. 85 ref. (H general, SG-h)

57-H. Preparation of Metals in a Finely Divided State for Use as Catalyst. W. J. C. de Kok and H. I. Waterman. *Journal of Applied Chemistry,* v. 1, May 1951, p. 196-198.

Metals and alloys, commonly used as catalysts, are prepared in a finely divided state by atomizing under pressure. The sprayed particles are activated by oxidation, e.g., with sodium hyperchlorite solution, washed, dried, and reduced with H_2. The metals and alloys examined were Ni, Ni-Cr (80% Ni, 20% Cr), monel, and V_4 steel, the starting material being wire in all cases. (H10, T29, Ni, AY)

58-H. Production of Powdered Alloys of Chromium and of Manganese. (In French.) Pierre Jolibois and Bernard Fleureau. *Comptes Rendus hebdomadaires dés Séances de l'Academie des Sciences,* v. 232, Mar. 28, 1951, p. 1272-1274.

Experimental work on production of Cr and Mn by hydrogen reduction of metallic oxides. Reduction of Fe_2O_3 was also studied alone and in mixtures with Cr_2O_3 and Mn_3O_4, respectively. (H10, Cr, Mn)

59-H. British Wire Gear Maker Adds Powder Shop. John Rigby. *Iron Age,* v. 167, June 21, 1951, p. 90-91.

Powder metallurgy has taken gear and pinion business away from shaped wire in America. British wire gear maker has followed suit by installing a powder fabricating shop. On small, complicated parts, powdered metal has cut costs 50%. Bulk of work has been with Fe powder. (H general, T7, Fe)

60-H. Sintered Contact Materials. Part I. (In Polish.) A. Krupkowski, W. Rutkowski, and S. Stolarz. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 2, 1951, p. 149-160.

Composite electrical contact materials based on W-Cu and W-Ag were investigated. Effects of composition, particle size, applied pressure, temperature, and time of sintering on density, hardness, electrical conductivity, and arcing resistance. Best results were obtained for 60-70% W, rest Cu or Ag. It was found advantageous to use coarser W powders (50-300 μ range), obtained by mechanical comminution of sintered W. Compacting pressures above 15 tons per sq. cm., sintering temperature of 1000-1100° C., and sintering times of 3-4 hr. in dry H_2 are recommended. (H15, W, Cu, Ag)

61-H. Rate of Sintering of Copper Under a Dead Load. F. N. Rhines and H. S. Cannon. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 529-530.

Application of a static load to a Cu powder compact during sintering at an elevated temperature accelerates the rate of sintering in such a way that a given load induces the same proportional increase in rate for all times of sintering. Shows that sintering under a load is like creep under a fixed load in that stress required to accomplish a given degree of densification is proportional to the logarithm of the sintering time. (H15, Cu)

62-H. A Method for Annealing Metal Powders Without Sintering. F. W. Batchelder and H. E. Stauss. *Review of Scientific Instruments,* v. 22, June 1951, p. 396-397.

A method for maintaining the separation of the component particles during the annealing of a metallic powder. The powder is mixed with a large quantity of a second powder which is chemically inert with respect to the metal, the mixed powders are annealed, and the metal separated by dissolving the inert powder. In this way, Au, Ag, and Fe powders were annealed in NaCl without sintering. (H12, Au, Ag, Fe)

63-H. Theory and Practice of Pressing Pulverized Materials. (In German.) Carl Ballhausen. *Archiv für das Eisenhüttenwesen,* v. 22, May-June 1951, p. 185-196.

With the aid of the analogy of a rubber belt over a pulley and held down by different sized weights on the two ends, an equation is derived for relationship between mold friction and applied pressure, resulting in unequal pressure distribution. Measurements on rubber, Pb, Fe, and Cu confirmed validity of the equation. (H14)

64-H. On the Combining Process of Metals. (In German.) E. Schwarz-

Bergkampf. *Berg-und Hüttenmännische Monatshefte,* v. 96, May 1951, p. 116-118.

Shows that passing current (and consequently electrons) between two pieces of metal always effects a combination or transfer of metal, and that this principle can profitably be applied to powder metallurgy. Experiments prove that a slight electric charge passed through pressed and sintered samples increases degree and uniformity of their strength. 6 ref. (H11)

65-H. Design in Powder Metallurgy. H. W. Greenwood. *Metal Industry,* v. 79, July 6, 1951, p. 3-5; July 13, 1951, p. 31-33.

Basic principles of design of parts, dies, and tools in the field of powder metallurgy. Design steps, effect of powder composition, techniques, and physical properties of molded pieces. The general rules covering shape and thickness of parts. Factors governing design of dies and punches. Economic aspects of design in powder metallurgy. (H general)

66-H. Powder Metallurgy of Zirconium. Henry H. Hausner, Herbert S. Kalish, and Roswell P. Angier. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 625-633.

How Zr of high purity can be fabricated by powder metallurgy methods. Use of ZrH powder for compacting and sintering leads to a more superior product than does use of Zr powder. Pressing and sintering conditions that permit the powder-metallurgical fabrication of Zr are established. Tests on physical characteristics. 13 ref. (H14, H15, Zr)

67-H. Powdered Metal Parts. Irving J. Donahue. *Western Machinery and Steel World,* v. 42, July 1951, p. 84-86, 96.

Operations at the Powdered Metal Division of Kwikset Locks, Inc. Advantages of the process. (H general)

68-H. The Economy of Good Design in Powder Metallurgy. H. W. Greenwood. *Machinery Lloyd* (Overseas Ed.), v. 23, July 21, 1951, p. 83, 85-86.

A general discussion. (H general)

69-H. Sintered Alloys for High-Temperature Service in Gas Turbines. R. W. A. Buswell, W. R. Pitkin, and I. Jenkins. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 258-268.

A cobalt-base alloy of the Vitallium type of low porosity was developed by powder-metallurgy methods to compare properties of an alloy prepared by a straightforward sintering process and a similar cast alloy. Possibility of improving the high-temperature strength by the introduction of refractory oxides such as thoria. The effect of aging on mechanical properties and the significance of crystallographic transformation during aging. 11 ref. (H15, T25, Co, SG-h)

70-H. Obtaining Continuous Bands by Rolling Powdered Iron. (In French.) *Métallurgie et la Construction Méchanique,* v. 83, Mar. 1951, p. 179-181; Apr. 1951, p. 261-263, 265-266.

Size of rolling groove, thickness of rolled bands, cylinders used and rate of rotation, technical comparison and rolling, duration and temperature of sintering, compression of sintered bands, and manufacture of sheet iron. (H14, Fe)

71-H. Studies of the Sintering Mechanism. (In French.) P. Laurent and M. Eudier. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 271-275.

Theories and physical characteristics of sintering as applied in powder metallurgy. Data for Fe and Cu. 11 ref. (H15, Fe, Cu)

72-H. Trends in the Development of Powder Metallurgy. (In German.) P. Schwarzkopf. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, June 1951, p. 161-170.

Surveys recent developments. 38 ref. (H general)

73-H. Powder-Metal Gears. D. W. Lynch, T. J. Snodgrass, and T. T. Woodson. *American Machinist,* v. 95, Aug. 20, 1951, p. 104-110.

Shows how unexpectedly high tooth strengths have recently been attained by impregnating powder-metal gears with other metals. Applications, relative costs, tolerances, and manufacturing hints are included. Usual base materials are brass or iron. Impregnation with Cu greatly improves mechanical properties. (H16, Q23, T7, Fe, Cu)

74-H. Sintered Iron Rotating Bands for Ordnance Use. Alden M. Burghardt. *Industrial Heating,* v. 18, Aug. 1951, p. 1376, 1378. (A condensation.)

Utilization of powder metallurgy in production of sintered iron bands. (H general, T2, Fe)

75-H. Alloyed Metal Powders Replace Machine Casting. Daniel W. Hoyt. *Iron Age,* v. 168, Aug. 23, 1951, p. 63-65.

Costly machining was eliminated when iron powder waste-disposer impeller blades were run through a continuous 2020° F. furnace, with Cr powder infiltrant blanks on top. Density up to 97% was obtained with good ductility. Cyaniding pro-

vides tensile strength up to 90,000 psi. and hardness to 300 Brinell. (H16, Fe)

76-H. Brass Powder Parts Aid Fuze Output. *Iron Age,* v. 168, Aug. 16, 1951, p. 108.

Factors to be considered in use of powder metallurgy process in the production of precision fuze components. (H general, Cu)

77-H. Looking Forward in Powder Metallurgy. H. W. Greenwood. *Machinery* (London), v. 79, Aug. 1951, p. 236-237.

Future prospects, including use of coated powders and possibilities of Ti. (H general)

78-H. Hard Metals by Impregnation. *Metal Progress,* v. 60, Aug. 1951, p. 118, 120, 122. (Condensed from "The Preparation of Cemented Carbides by Infiltration," R. Kieffer and F. Kölbl, *Berg- und hüttenmännische Monatshefte,* v. 95, Mar. 1950, p. 49-58.)

Two types of products were investigated. The first included those compositions conventionally used for cutting tools. The second consisted of pure TiC and TiC with addition of MoC impregnated with Ni-Cr, Co-Cr, and Co-Cr-Mo alloys. Hardness, wear resistance, and high-temperature oxidation resistance of a variety of compositions were studied. Possible use in turbine blades. (H16, C-n)

79-H. Powder Metallurgy of Beryllium. Henry H. Hausner and Norman P. Pinto. *Transactions of American Society for Metals,* v. 43, 1951, p. 1052-1069; disc., p. 1069-1071.

Previously abstracted from *American Society for Metals,* Preprint 39, 1950. See item 74-H, 1950. (H14, H15, Q general, M21, Be)

80-H. Investigation of the Processes of Pressing and Sintering of Metallic Powders by an Electrical Conductivity Method. (In Russian.) V. I. Likhtman and L. T. Nazarov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser. v. 78, June 1, 1951, p. 749-752.

Formation of areas of contact between the metallic particles during pressing and sintering was investigated by a method based on the fact that electrical conductivity through a sintered body is a function of average area and number of contact zones. Pressing and sintering of dry Cr, Fe, and Pb powders, also in the presence of "active" and "inactive" lubricants was studied, using this method. (H14, H15, Cr, Fe, Pb)

81-H. Particle Size Analysis of Metal Powders. C. C. Gregg and Bernard Kopelman. *American Society for Metals,* Preprint 32, 1951, 12 pages.

Rapid, routine methods for engineering control in the manufacture of metal powders. The procedure worked out for determining particle size and size distribution of subsieve tungsten powder has also been adapted with considerable success to other metals and inorganic powders. Other methods of analyses. (H11)

82-H. Powder Metal Boosts Jet Blade Output. *Aviation Week,* v. 55, Sept. 17, 1951, p. 30, 33.

Production of jet engine compressor stator blades by application of powder metallurgy. Principal material is Fe powder made from mill scale. A lubricant and small amounts of Cu powder are also incorporated. A large saving in Cr and Ni over conventional blades is made possible. (H general, T25, Fe)

83-H. Role of Gases in the Production of High Density Powder Compacts. Donald Warren and J. F. Libsch. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 774-781.

The influence of various pressing and sintering conditions upon the permeability, density, and percentage of pores connected to the surface of 50-50 Fe-Co powder compacts. The effect of evolved gases on the sintering process and the minimization of the influence of such gases. 20 ref. (H11, H14, H15, Fe, Co)

84-H. Some Relations of Powder Characteristics to the Elastic Modulus and Shrinkage of Sintered Ferrous Compacts. G. D. McAdam. *Journal of the Iron and Steel Institute,* v. 168, Aug. 1951, p. 346-358.

Attention is directed mainly to an alloy of the nominal composition 90% Fe, 8% Cu, 2% graphite. Powders were distinguished in terms of particle dimensions, size distribution, surface shape, density and molding characteristics. Special apparatus and general test procedure. An empirical equation was derived from which it was possible to predetermine the linear contraction of standard Fe-Cu-C alloys at 1100° C. in terms of packing, green, and theoretical densities, and particle size. 22 ref. (H11, Fe)

85-H. The Photography of Metallic Powders. S. D. Ford and B. W. Mott. *Metal Treatment and Drop Forging,* v. 18, Aug. 1951, p. 360-362.

Various experimental methods of lighting for use in the photography of metal powders. The most suitable method involves the use of a viscous liquid for suspending the powder and of a double lighting system em-

ploying a catoptric condenser and a substage condenser. (H11)

86-H. Kinetics of Sintering Chromium Carbide. W. G. Lidman and H. J. Hamjian. *National Advisory Committee for Aeronautics,* Technical Note 2491, Aug. 1951, 16 pages.

Sintering of chromium carbide under pressure was investigated in order to study kinetics of grain growth and densification during this process. The results indicated that the grain diameter D and sintering time t can be related by the expression $D^n = Kt$ where K is a rate constant. The value of n was associated with location, size, and shape of the pores in the compact. (H15, Cr, C-n)

87-H. Density of Powder Metal Parts Controlled Accurately. A. H. Allen. *Steel,* v. 129, Sept. 17, 1951, p. 84-85.

A newly developed hydraulic press provides a means of accurately controlling density in pressing powder metal parts of varying cross-section. (H14)

88-H. Flexible Design and Lower Costs Achieved by Powdered Metallurgy. Charles L. Bigelow. *Western Metals,* v. 9, Aug. 1951, p. 39-41.

Fabrication of powdered brass and Fe parts for locks. (H general, T6, Cu, Fe)

89-H. Investigation of Specific Surface of Metallic Powders. (In Russian.) I. M. Fedorchenko. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1951, p. 411-418.

Specific surfaces of Fe, Ni, and Cu powders depending on production method and particle sizes were systematically investigated. It is found that powders produced at low temperatures by the carbonyl, centrifugal, and electrolytic methods possess greatest specific surface. Method of investigation and results. (H11, Fe, Ni, Cu)

90-H. Close Weight Tolerance on Truck Governor Weights Made by Powder Metallurgy. R. R. Abbott. *Precision Metal Molding,* v. 9, Sept. 1951, p. 38-39, 93-94.

Changes in section, combined with odd angles, and with no uniform dimensions in the direction of applied pressure during forming, all combine to make these governor weights unique. (H general, Cu)

91-H. Structural Parts by Powder Metallurgy: a Report of Available Metals and Their Characteristics. Philip R. Kalischer. *Precision Metal Molding,* v. 9, Sept. 1951, p. 45-47, 80-83.

Surveys data on copper-impregnated iron parts, pure-iron compacts, plain-carbon steels, alloy steels, stainless steels, and brasses and bronzes. (H general, Fe, CN, AY, SS, Cu)

92-H. Sintering of Porous Bronze Compacts. E. J. Williams. *Australasian Engineer,* Aug. 7, 1951, p. 79-83.

An alloy of 90 parts Sn, 10 parts Cu and 2 parts graphite was prepared from the corresponding powders by cold pressing into cylindrical compacts. Sintering was carried out with varying times and temperatures in an atmosphere produced by powdered charcoal. Variations of sintering temperature were found to produce greater changes in properties and structure than variations of sintering time. The heating rate was observed to have an appreciable effect on the dimensions and density of the sintered part. 14 ref. (H15, Cu)

93-H. Production of Ductile Vanadium by Calcium Reduction of Vanadium Trioxide. E. D. Gregory and W. C. Lillendahl, and D. M. Wroughton. *Journal of the Electrochemical Society,* v. 98, Oct. 1951, p. 395-399.

A process for the production of high-purity V powder by the reduction of V_2O_3 with Ca and the forming, treating, and mechanical working of V compacts. Soft, ductile V rod, wire, and sheet were produced following powder metallurgy practice. 12 ref. (H general, V)

94-H. Production of Powdered Uranium and Thorium. P. Chiotti and B. A. Rogers. *Metal Progress,* v. 60, Sept. 1951, p. 60-65.

Method used at Ames Laboratory, for Atomic Energy Commission. The processes involve two stages: production of the metal hydrides, and their decomposition to powder. (H10, U, Th)

95-H. Sintering Copper-Tin Powders. (In Portuguese.) Vicente Chiaverini. *Boletim da Associacao Brasileira de Metais,* v. 7, Apr. 1951, p. 133-160.

Behavior of Cu-Sn powders during sintering as well as under the influence of graphite and calcium stearate was studied. (H15, Cu, Sn)

96-H. Powder-Metal Parts; Their Physical Characteristics and Design Advantages. George H. Logan. *Machine Design,* v. 23, Oct. 1951, p. 133-136.

An illustrated survey. Production methods, comparative mechanical properties of sintered and heat treated powdered metal parts of steel, iron, brass, and bronze. (H general, Q general, ST, Fe, Cu)

97-H. High Permeability "Sendust" Powder Ring Cores. E. G. Thurlby. *Metal Progress,* v. 60, Oct. 1951, p. 83-87.

"Sendust" is a high-permeability alloy discovered by Honda, Masumoto, and Yamamoto during investigation of the magnetic properties of the Fe-rich Fe-Si-Al alloys. Preliminary investigation was made to establish a manufacturing technique for Sendust powder cores, having a permeability of 80-90 coupled with acceptable loss factors, for use in loading coils for voice frequencies and transmission-network applications generally. Melting, crushing, ball milling, annealing, binding-agents, pressing, and baking methods used in Japan and also those used by the author.
(H general, P16, SG-n, p)

98-H. What About Metal-Powder Parts? *Product Engineering*, v. 22, Oct. 1951, p. 142.

Advantages of powder metallurgy process. Brass, Cu, bronze, Zn, and Fe powders are included.
(H general, Cu, Zn, Fe)

99-H. Evaluation of Sieve Analyses in Powder Metallurgy. (In Czech.) Adolf Vambersky. *Hutnické Listy*, v. 6, July 1951, p. 320-322.

The proper grain-size distribution of metallic powders. Shows how to determine deviations from ideal behavior and their significance. (H11)

100-H. Bonds of Sintered and Pressed Metals Produced by Pressing and Sintering. (In German.) Wilhelm Hofmann and Ernst Schmalenbach. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft*, v. 3, 1951, p. 163-176.

Bonds between sintered powered metal and wrought metal were obtained in the following combinations: Fe powder upon steel, Fe-Cu upon steel, Pb bronze upon steel, W-Cu upon Cu, and Ag-graphite upon Cu. The powder was pressed into the surface of the base metal and then both were sintered. Influence of grain size, of pressure, and of sintering temperature were investigated. The strength of the joint was examined by tensile and shear test.
(H14, H15, Q27, Fe, ST, Cu, W, Ag)

101-H. Production of Metal Powders by Atomization. (In Polish.) W. Rutkowski. *Prace Glownego Instytutu Metalurgii*, v. 3, No. 3, 1951, p. 259-266.

Historical development of metal-powder production by methods based on granulation and atomization. Installations for atomization of low-melting-point metals such as Sn, Pb, Zn, and Al, and of high-melting-point metals such as Cu, bronze, Fe, and steel. Influence of various factors upon the quality of atomized powder and efficiency of the process. 11 ref. (H10)

102-H. Mechanical Properties of Stainless Steel Powder. *Journal of Metals*, v. 3, Nov. 1951; *Transactions of the Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 1076.

Discussion of above paper (by Arthur H. Grobe and George A. Roberts). (Feb. 1951 issue, see item 6-H, 1951.) (H11, Q27, Q29, SS)

103-H. Fabrication and Properties of Compacts of Pure Tungsten Carbide. A. E. Williams. *Metal Treatment and Drop Forging*, v. 18, Oct. 1951, p. 445-449.

The mechanism of sintering pure tungsten carbide was investigated to develop crucibles and high-temperature furnace parts. The cold-pressing and sintering method and the hot-pressing method. Mechanical properties and microstructure of the products. 10 ref. (H14, H15, W, C-n)

104-H. Powder Metallurgy in 1950. (In German.) F. Benesovsky. *Metall*, v. 5, Sept. 1951, p. 384-388.

A review. 174 ref. (H general)

105-H. Swelling Phenomena and Zone Formation in Hard-Metal Alloys. (In German.) Walther Dawihl. *Zeitschrift für Metallkunde*, v. 42, July 1951, p. 193-197.

Experiments demonstrate that swelling occurs when gases formed during sintering are unable to escape, when the wetting properties of the melt are relatively high, and when gas pressure exceeds the strength of the sintered structure. Zone formation occurs in sintered alloys at temperatures at which the resulting molten phase has low wetting power for the solid structure. These phenomena are applied to WC-TiC solutions. 11 ref.
(H15, C-n, W, Ti)

106-H. Sintered Electrical Contact Materials. Part II. (In Polish.) W. Rutkowski and St. Stolarz. *Prace Glownego Instytutu Metalurgii*, v. 3, No. 4, 1951, p. 297-305.

Methods of producing contacts based on W-Cu and W-Ag, their properties and applications. Service behavior and commercial production.
(H general, T1, W, Cu, Ag, SG-r)

107-H. Stainless Steel Filter With High Strength Produced by Powder Metallurgy. *Precision Metal Molding*, v. 9, Nov. 1951, p. 39.
(H general, T29, SS)

108-H. Friction or Bearing Surfaces by Powder Metallurgy and Die Casting. H. W. Brock. *Precision Metal Molding*, v. 9, Nov. 1951, p. 40-42, 64-65.

Applications of the processes by Oliver Corp. Advantages.
(H general, E13, SG-c)

109-H. Controlled Porosity Is Utilized for Fluid Distribution in Aircraft De-Icers: An Application of Powder Metallurgy. R. I. Blackwell and J. W. Lennox. *Precision Metal Molding,* v. 9, Nov. 1951, p. 28-31, 65-69.

The porous metal is made from Cu, Ni, and Sn powders carefully controlled as to both mesh size and particle shape. Brazing and sintering operations are involved. (H11, K8, T24, Cu, Ni, Sn)

110-H. Powder Metallurgy: Past, Present and Future. Robert L. Ziegfield and Kempton H. Roll. *Precision Metal Molding,* v. 9, Nov. 1951, p. 75-82.

SECTION J

HEAT TREATMENT

1-J. Induction Hardening Cuts Costs at Studebaker. *Automotive Industries,* v. 103, Dec. 15, 1950, p. 50, 98.

Miscellaneous applications.
(J2, ST)

2-J. 3 Million Axle Shafts Induction Hardened. S. L. Widrig and C. A. Payntor *Iron Age,* v. 166, Dec. 21, 1950, p. 69-73.

Improved physical properties and reduced production costs through use of plain carbon steel instead of alloy grades were achieved by induction hardening of axle shafts. Production was increased and some operations were eliminated.
(J2, CN)

3-J. Carbonitriding in Present Practice. Walter H. Holcroft. *Metal Progress,* v. 58, Dec. 1950, p. 843-846.

Work which showed that heating of steel in a neutral carrier gas plus methane and ammonia can produce various effects with minimum distortion ranging from carbon restoration or superficial nitriding to fairly deep and complex cases, depending on gas mixture and heating cycle. (J28, ST)

4-J. Distortion of Toolsteel in Heat Treatment. J. Y. Riedel. *Metal Progress,* v. 58, Dec. 1950, p. 853-859.

Effects of steel composition, quenching medium, and tool shape on distortion. How to predict amount of distortion and how to minimize it in practical heat treatment.
(J26, TS)

5-J. Engineering Properties of Iron Castings Can Be Improved by Heat Treatment. C. E. Herington. *Materials & Methods,* v. 32, Dec. 1950, p. 50-53.

The uniformity of Meehanite iron castings is said to make them especially suitable for through-hardening as well as for local or surface-hardening operations. Recommended procedures and typical results.
(J26, CI)

6-J. Induction Heating in the Steel Industry. E. H. Browning. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 82-89.

Principles, clarified by diagrams. Applications and equipment.
(J2, ST)

7-J. Suggested Heat Treatment and Forming Data for Boiler and Pressure Vessel Steels. *Welding Journal,* v. 29, Dec. 1950, p. 622s-623s.

A table.
(J23, Q23, G general, CN, AY)

8-J. Cementation by Carbon and by Nitrogen. (In French) (Concluded.) J. Pomey. *Revue de Métallurgie,* v. 47, Oct. 1950, p. 727-738.

Final installment. Calculation of coefficient of diffusion on the basis of activity coefficient, chemical factors influencing these coefficients, variation of coefficient of diffusion with temperature, influence of nitrogen on the diffusion of carbon, crystallographic orientation, and diffusion in the presence of two phases. 28 ref. (J28, N1, ST)

9-J. Influence of Homogenizing Heat Treatment During Alloy Production on Workability and Mechanical Properties of Light Alloys. (In French) Martial Renouard. *Revue de Métallurgie,* v. 47, Oct. 1950, p. 760-768; disc., p. 768.

Investigated for an Al-Zn-Mg alloy and two Al-Mg alloys. Modifications of microstructure caused by the treatment are illustrated.
(J21, Al)

10-J. Aging of Iron and Steel. (In French.) J. D. Fast. *Revue de Métallurgie,* v. 47, Oct. 1950, p. 779-786; disc., p. 786.

Artificial aging and aging by deformation of Fe, Fe + 0.04% C, Fe + 0.03% O_2, and Fe + 0.02 N_2, were studied. Influence of Mn additions on artificial aging, and of Mn and Ti on aging by deformation, were studied. (J27, N7, Fe, St)

11-J Some Metallurgical Aspects of Superficial Torch Tempering. (In French.) R. Quigna. *Soudure et Techniques Connexes,* v. 4, Sept.-Oct. 1950, p. 206-214.

Investigation of physicochemical phenomena and changes in crystal structure of steel during torch tempering. Behavior during welding, oxyacetylene-torch tempering, and normal heat treatment is compared. Photomicrographs illustrate structures. (J2, J29, N8, CN)

12-J. Aluminum Mirrors Improve the Efficiency of Industrial Furnaces. (In French.) Marcel Palmier. *Revue de l'Aluminium,* v. 27, Sept. 1950, 313-314.

A spherical Al mirror set above a salt-bath furnace, by reflecting the heat which is normally lost, allows a reduction of power consumption and an increased rate of output. On a furnace working under reduced power conditions, this simple low-cost device has led to a 94% increase in production. (J2)

13-J. Surface Hardening of Ends of Railroad Rails. (In Russian.) I. F. Sharov and E. L. Guralnik. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 25-27.

Possibility of increasing service life of rails by surface hardening the adjoining ends, particularly choice of a method which may be applied to rails already in service with a minimum interruption of traffic. Use of an oxy-acetylene torch. Metallic structure of rails after such surface hardening. (J2, CN)

14-J. The Iron Age Mid-Century Reference of Heat Treating. F. R. Morral. *Iron Age,* v. 167, Jan. 4, 1951, p. 267-268, 448-458, 460-462.

Claims to be the most complete and modern index of references on time-temperature-transformation reactions ever assembled. Ferrous and nonferrous metals are included. Effects on austenite transformations of chemistry, grain size, segregation, cleanliness, etc., as well as time and temperature. Isothermal heat treating practices are included. The list of references is preceded by a classified subject guide. (J26, N8)

15-J. Carbonitriding. I-II. *Industrial Heating,* v. 17, Nov. 1950, p. 1936, 1938, 1940, 2050, 2052; Dec. 1950, p. 2120, 2122, 2124.

Part I is condensed from "The Carbonitriding Process of Case Hardening Steel", by G. W. P. Rengstorff, M. B. Bever, and C. F. Floe, *American Society for Metals,* Preprint No. 1, 1950; and Part II from "Constitution of Carbonitrided Cases" (same authors), *American Society for Metals,* Preprint No. 2, 1950. See items 226-J and 230-J, 1950. (J28, M24, N8, CN)

16-J. Steels for Casehardening and Nitriding. (In German.) Fritz Brühl. *Stahl und Eisen,* v. 70, Nov. 9, 1950, p. 1060-1063.

Investigation of the suitability of six low-alloy steels for case hardening and of six other steels for nitriding. Tables and graphs show their respective compositions, tensile strengths, and hardnesses. American and French nitralloy steels. 21 ref. (J28, Q general, AY)

17-J. Determining the Quench Hardenability of Structural Steels. (In German.) Richard Pusch. *Stahl und Eisen,* v. 70, Nov. 9, 1950, p. 1064-1069.

Progress report of cooperative research made to standardize hardenability tests. In the end-quench test, a single specimen can replace a whole series of hardness-depth test specimens. Indicates that the McQuaid-Ehn grain-size determination does not give a reliable indication of hardenability of structural steels. (J26, CN)

18-J. Experiences With the Hardenability Testing of Steels by the End-Quench Method. (In German.) Ernst Rossow and Leopold Schmidt. *Stahl und Eisen,* v. 70, Nov. 9, 1950, p. 1069-1073.

Results of evaluation of the method show that it is very satisfactory for the study of miscellaneous heat treatments and other factors. 11 ref. (J26, ST)

19-J. Investigations on the Deformation of Steels Due to Heat Treatments. (In Japanese with 3-page English abstract.) Minoru Tanaka. *Bulletin of the Tokyo Institute of Technology,* ser. A, No. 2, 1949, p. 1-75.

Part I: dimensional changes due to quenching and decomposition of martensite for plain carbon steels containing 0.19, 0.52, 0.95, and 1.06% C. Part II: results of experiments on influence of quantity and condition of martensite on internal stresses in cemented carbon steels and plain carbon steels containing 0.6, 0.9, and 1.1% C, which were water quenched or austempered. Results of hardness tests and microscopic examination. Part III: effects of alloying elements on the stabilization of martensite, as determined by dimensional changes of eight kinds of nonshrinking steels during quenching, natural aging for two years, and tempering. (J26, Q25, N8, CN)

20-J. Study of Quenching Methods for Hollow Steel Rods. (In Japanese.)

Tatsuo Tanaka and Yutaka Imai. *Journal of Mechanical Laboratory,* v. 4, July 1950, p. 75-79.

Results of a study of various methods. (J26, ST)

21-J. Good Carburizing Practice. V. Salt Baths Save Process Time. VI. Choose Steels for Case and Core Properties. T. A. Frischman. *American Machinist,* v. 94, Dec. 25, 1950, p. 89-93; v. 95, Jan. 8, 1951, p. 90-93.

Part V: Fast heating and case depths equal to those produced by other carburizing processes are shown to be possible with liquid salt bath carburizing. Advantages of the process are said to outweigh its shortcomings. Equipment and typical data. Part VI: Choice of steel. (To be continued.) (J28, J2, ST)

22-J. Heat Treatment of Armor Plate. Horace Drever. *Industrial Heating,* v. 17, Dec. 1950, p. 2106-2108, 2110-2112, 2114, 2116, 2118.

Equipment and procedures of Drever Co., Philadelphia. (J general, T2, CN)

23-J. An Examination of the Quenching Constant, H. D. J. Carney and A. D. Janulionis. *Industrial Heating,* v. 17, Dec. 1950, p. 2128, 2130, 2132. (A condensation.)

Previously abstracted from *American Society for Metals,* Preprint No. 19, 1950. See item 228-J, 1950. (J26, SS)

24-J. Five Steps in Setting up a Heat-Treating Department. *SAE Journal,* v. 59, Jan. 1951, p. 54-57. (Excerpts from "The Heat-Treatment of Crawler Tractor Gears," by Roy F. Kern.)

Procedures, equipment, and layout of Allis-Chalmer's Springfield Works gear heat treating department. (J general, T7, ST)

25-J. Residual Stresses in Light Alloy Machine Parts. (In French.) Pierre Migny. *Revue de l'Aluminium,* v. 27, Nov. 1950, p. 398-403.

Origin of the stresses and their removal by thermal and mechanical treatments. (J1, G23, Al)

26-J. Effects of Different Heat-Treatments and Alloying Constituents on the Work-Hardening of Steel. (In German.) Georg Niebch and Anton Pomp. *Stahl und Eisen,* v. 70, Dec. 7, 1950, p. 1166-1173; disc., p. 1173-1174.

Seven low-alloy steels and one carbon steel were investigated, each being annealed and normalized, or soft annealed, then cold rolled to up to 40% reduction in thickness. The greatest hardness increase was observed in the normalized steels and in the Cr steels. Mg greatly accentuated the effect of Cr. 20 ref. (J23, J24, Q29, CN, AY)

27-J. Accuracy of Calculation of Depth of Carbon Penetration in Carburized Steels From Results of Large-Scale Experiments. (In German.) Hans Schrader and Ruth Moufang. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 381-393; disc., p. 393.

Analysis of results of 270 carburizing experiments with different alloy steels showed that the ordinary theory of diffusion in an infinite lattice is practically useless for describing the carburizing process. Wide differences in surface conditions of the steels and in the carburizing effects of different agents limit accuracy of calculation. (J28, ST)

28-J. Effect of Surface Condition of the Material to be Hardened on the Cooling Process in Liquid Hardening Agents. (In German.) Walter Peter. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 395-402.

Experiments were made with soft-iron balls 19 and 40 mm. in diam., and containing 0.58-1.0% C to determine effects of layers of scale and salt on the cooling process in a salt bath, in a highly concentrated salt solution, in oils, and in water used as quenching agents. (J2, Fe)

29-J. Methods of Determining the Depth of Case Hardening of Case-Hardened Materials. (In German.) Artur Kühnert. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 437-440.

A study of various methods for the above. Vickers hardness testing and examination of microstructures were found to give the most accurate results. 10 ref. (J28, Q29, ST)

30-J. Improvements in Furnaces and Methods for Heat Treatment. Floyd E. Harris. *Metal Progress,* v. 59, Jan. 1951, p. 62-68.

Reviews a decade of progress. (J general)

31-J. Annealing of Ti and Zr. A. M. Bounds and H. W. Cooper. *Metal Progress,* v. 59, Jan. 1951, p. 69, 100, 102.

Procedures. Concludes that annealing in air or a non-inert atmosphere produces scaling and surface hardness which cannot be eliminated by descaling or pickling. Inert atmospheres give satisfactory protection but are quite expensive, especially for large parts, wire, or tubing. Recommends vacuum annealing for light parts; and molten-caustic descaling. (J23, L12, Ti, Zr)

32-J. Steel Castings; A Review of the Literature on Homogenisation. A. Hartley. *Iron and Steel,* v. 23, Dec. 1950, p. 511-514.
17 references. (J21, CI)

33-J. Influence of Gaseous Atmospheres on Formation of Bubbles in Beryllium Bronze. (In Russian.) A. K. Chertavskikh and Yu. A. Klyachko. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Oct. 1950, p. 1032-1039.
Experimental investigation showed that bubbles form, during heat treatment, upon attaining a critical temperature of 800-810° C., and that formation proceeds especially vigorously in an atmosphere containing H_2O or NH_3. Mechanism of bubble formation is explained on the basis of initiation, at the critical temperature, of a self-propagating chain reaction of dissociation of steam adsorbed on the external and internal surfaces of the metal, releasing hydrogen. Test specimens are illustrated showing bubble formation. (J23, Cu)

34-J. Effect of Heating Rate on Graphitization of White Iron. Masazo Okamoto. *Foundry,* v. 79, Feb. 1951, p. 101.
Results of recent Japanese investigations, comparing them with those of Palmer and of Schneidewind. (J23, N8, CI)

35-J. Liquid Flame Hardening Used to Selectively Harden Steel Gear Teeth. T. C. Du Mond. *Materials & Methods,* v. 33, Jan. 1951, p. 74-75.
Use of a molten salt bath and a simple fixture solved the problem of locally heat treating alloy steel gears after other methods proved unsatisfactory. (J2, AY)

36-J. Harley-Davidson Meets Higher Production Schedules. Arthur Q. Smith. *Industrial Gas,* v. 29, Jan. 1951, p. 3-6, 25-26.
How modern furnaces treat parts requiring special metallurgical characteristics in motorcycle production. Other uses of gas-fired furnaces in production of motorcycle parts. (J general, L general, ST)

37-J. Practical Toolmaking, Part II. J. Y. Riedel. *Modern Machine Shop,* v. 23, Feb. 1951, p. 116-120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142.
Distortion of toolsteel during heat treatment and its prevention. (J general, TS)

38-J. Electric Furnaces Provide Savings in Producing Malleable Castings. *Modern Machine Shop,* v. 23, Feb. 1951, p. 222, 224, 226.
Annealing furnaces of National Malleable and Steel Castings Co. (J23, CI)

39-J. The Aging of Sand-Cast Mg-Al-Zn Alloys. T. E. Leontis and C. E. Nelson. *Journal of Metals,* v. 191, Feb. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 120-124.
Aging studies on AZ63A and AZ92A show that a wide variation in mechanical properties can be attained by selection of aging temperature and time. 14 ref. (J27, Q general, Mg)

40-J. Induction Heating. Ed Bukstein. *Radio & Television News,* v. 45, Feb. 1951, p. 35, 92-93.
Apparatus and its application to various metal-fabricating procedures. (J2)

41-J. Ford Bushings Heat Treated Efficiently in Furnaces With Rotary Retorts. *Industrial Heating,* v. 18, Jan. 1951, p. 30-34, 36.
(J general, ST)

42-J. High Speed Heating of Steel. M. H. Mawhinney. *Industrial Heating,* v. 18, Jan. 1951, p. 40-44, 172, 174, 176.
Examines a number of different furnaces whose rate of heating exceeds 100 lb. per hr. A relationship between heat transfer and heating rate, and information to assist evaluation of this method of heating. A table shows pertinent data on seven furnaces heating cold steel and one steel which had been preheated to 1250° F. (J general, F21, ST)

43-J. Annealing of Malleable Iron Castings in Electric Furnaces Effects Substantial Savings at National Malleable. *Industrial Heating,* v. 18, Jan. 1951, p. 46-48.
Equipment and procedures. (J23, CI)

44-J. Mass Marquenching Speeds Gear Output. W. B. Cheney and W. C. Hiatt. *Steel,* v. 128, Feb. 12, 1951, p. 72-74.
Rearranged and modernized heat treating facilities of International Harvester Co. at the Ft. Wayne Works. Five radiant-tube gas carburizers are used to marquench alloy steel transmission gears, differential side gears, side pinion gears, king pins, and miscellaneous shafts. Results of comparative study of regular quenching and marquenching. (J26, T7, AY)

45-J. Salt Bath Quenching of Steel. *Heat Treating,* v. 1, Dec. 1950, p. 8-9.
Recommended heating and quenching media and their applications to carburizing of steel. (J2, J28, ST)

46-J. Safe Handling of Cyanide Type Heat Treating Salts. *Heat Treating,* v. 1, Dec. 1950, p. 14-15, 19.
Recommendations. (J2)

47-J. Heat Treatment Plant for the English Needle Industry. *Heat Treating,* v. 1, Dec. 1950, p. 16-17. (From *Wire Industry,* Aug. 1950.)
(J26, ST)

48-J. Modern Heat-Treatment Furnaces With Special Reference to Town's Gas Firing. L. G. A. Leonard. *Metal Treatment and Drop Forging,* v. 18, Jan. 1951, p. 25-32.
Some of the various types of burners and furnaces available for heat treatment processes. (J general)

49-J. Stress Relief and Allied Problems in Magnesium Alloy Castings. R. J. M. Payne. *Journal of the Institute of Metals,* v. 78, Oct. 1950, p. 147-168.
A method by which degree of stress relief resulting from any given annealing treatment may conveniently be evaluated. The method is capable of general application to stress-relief annealing problems and has been used to establish suitable conditions of treatment for a number of Mg and Al base casting alloys. Problems associated with heat treatment of four Elektron casting alloys for stress removal (Mg-Al alloy AZ91; Mg-Al alloy A8; the Mg-Zn-Zr alloy Z5Z; and Mg + rare-earth + Zr alloy MCZ). (J1, Mg)

50-J. Stress-Ageing Treatment and Its Effects on the Physical Properties of Copper-, Iron-, and Aluminium-Base Alloys. R. F. Gill, E. A. Smith, and R. H. Harrington. *Journal of the Institute of Metals,* v. 78, Nov. 1950, p. 203-228.
"Stress-aging" is a treatment which consists of heating an alloy, for the correct time and at a suitable temperature, while it is subjected to a specific stress from an external load. By this treatment it is possible, in alloys that possess recrystallization temperatures effectively above room temperature, to double and almost treble the elastic properties, to increase tensile strength, and simultaneously to raise the elongation and electrical conductivity. Results of extensive experimental work on the treatment as applied to 8 Cu-base, 5 Fe-base, and 11 Al-base alloys. Effects on microstructures.
(J27, Q general, Cu, Fe, Al, SS)

51-J. Arc Surface Hardening. (In Russian.) K. K. Khrenov and G. V. Vasilev. *Avtogennoe Delo* (Welding), v. 21, Oct. 1950, p. 1-5.
Experimental work on hardening the working surfaces of rails which had been in service a long time. Possibility of heating metal by a direct carbon arc without melting the surface was confirmed. Details of arc heating procedure. Data for designing an industrial installation. (J26, J2, ST)

52-J. New Method of Gaseous Carburization. (In Russian.) L. E. Semina, V. A. Rzhepetskogo, and N. I. Chetyrina. *Promyshlennaya Energetika* (Industrial Power), v. 7, Oct. 1950, p. 11-12.
The carburizing gas is generated in the chamber of the carburization furnace itself and liquid combustibles are not required. The carburizing mixture contains 70% coal, 10% dry sawdust, and 20% calcined soda. Holding in the furnace 1 hr., 20 min. at 920° C. gives a 0.4-0.6-mm. carburized layer. Furnace details are shown schematically. (J28, ST)

53-J. The Problem of Deformation of Steel During Thermochemical Treatment. (In Russian.) *Vestnik Akademii Nauk SSSR* (News of the Academy of Sciences of the USSR), v. 20, Oct. 1950, p. 112-113.
The work of S. F. Yurev on internal reactions in steel between carburized and nitrided layers and core metal. (J28, ST)

54-J. Spheroidization of Eutectoidal Cementite in White Cast Iron. (In Polish). P. Piaskowski. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 4, 1950, p. 269-272.
The spheroidization process and properties obtained by it. A theory according to which the accelerated process of cementite spheroidization occurs in hypereutectoid Fe-C alloys due to formation of spheroidization nuclei at temperatures above the critical temperature range. The cementite of the eutectoid mixture that results from decomposition of austenite crystallizes on these nuclei. (J23, N8, CI)

55-J. Internal Stress Due to Quenching in Cylindrical Steel Ingots. (In English.) Tokutaro Hirone and Noboru Tsuya. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Oct. 1949, p. 169-173.
Mathematical analysis and graphical representation of the results.
(J26, Q25, ST)

56-J. Flame Hardening of Large Surfaces. J. J. Barry. *Welding Journal,* v. 30, Feb. 1951, p. 111-116.
Fundamental principles, historical development, and modern methods and applications. (J2)

57-J. Surface Hardening of Pearlitic Malleable Irons. S. H. Bush, W. P. Wood, and F. B. Rote. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 108-121; disc., p. 121.
Previously abstracted from preprint. See item 106-J, 1950. (J26, CI)

58-J. A Summary of the Quantitative Effects of Some Factors on the Annealing of White Cast Iron. Richard Schneidewind. *Transactions of the*

American Foundrymen's Society, v. 58, 1950, p. 202-207; disc., p. 207.

Effect of soaking temperature, temper-carbon form, method of heating, superheat deoxidation, and Si and C content on annealing rate. 15 ref. (J23, CI)

59-J. Furnace Atmosphere for Malleable Annealing. W. D. McMillan. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 365-373; disc., p. 373-375.

Previously abstracted from preprint. See item 105-J, 1950. (J23, CI)

60-J. Annealing of Monel, Nickel and Inconel. I. Various Methods Described and Illustrated. *Wire Industry,* v. 18, Jan. 1951, p. 53-55.

(To be continued.) (J23, Ni)

61-J. The Surface Hardening of Steel. Part I. Methods and Practices. G. T. Colegate. *Metal Treatment and Drop Forging,* v. 18, Jan. 1951, p. 5-12.

Introductory résumé of case hardening methods generally applied in industry, followed by a discussion of the function and properties of the case and core. (To be continued.) (J28, ST)

62-J. Modern Heat-Treatment Furnaces. L. G. A. Leonard. *Foundry Trade Journal,* v. 90, Jan. 25, 1951, p. 89-94. (A condensation).

The laws of heating and heat transmission, development of refractories, insulation, burners, and recuperation. Details of commercial gas-fired furnaces of various types. (J general)

63-J. Heat Treatment of Light Alloys; Quenching and Annealing. (In French.) Paul Penel. *Revue de l'Aluminium,* v. 27, Oct. 1950, p. 385-390.

The series of operations which constitute the heat treatment itself. Importance of the conditions in which they should be carried out. (To be continued.) (J23, J26, Al)

64-J. Heat Treatments Accompanying Cementation. (In French.) J. Pomey. *Revue de Métallurgie,* v. 47, Nov. 1950, p. 789-804; Dec. 1950, p. 895-906.

Confined to carburizing and nitriding of steel. Comprehensive descriptive review of the literature on the subject. 47 ref. (J28, ST)

65-J. (Book) **Heat-Treatment Fundamentals.** S. Collard Churchill. 66 pages. Machinery Publishing Co., Ltd., National House, West St., Brighton 1. England. (Machinery's Yellow Back No. 26). 3s., 6d.

Elementary description of the metallurgical knowledge necessary for understanding the practical processes of heat treatment. Transformations involved are described. Emphasis is on steel. (J general, N8, ST)

66-J. Flame-Hardening as a Versatile Production Tool. Gordon H. Silver. *Machinery* (American), v. 57, Feb. 1951, p. 187-189.

Flame-hardening of lathe-bed ways is a typical application. (J2, CN)

67-J. "Decarb" on Screw Products Yields to Controlled Atmosphere. John E. Tschopp. *American Machinist,* v. 95, Feb. 19, 1951, p. 142-143.

Methods and equipment used by Chicago Screw Co., Bellwood, Ill., to produce capscrews and bolts completely free of decarburization. The products are carried on a belt through a controlled-atmosphere furnace which restores the required carbon. They then pass through a water-quench tank. (J2, ST)

68-J. Economical Methods for Production Hardening. *Metal Treating,* v. 1, Nov. 1950, p. 6-9; v. 2, Jan.-Feb. 1951, p. 8-12.

A condensation of a recorded panel discussion held during an American Society for Metals meeting. (J26)

69-J. Which Process for Case-Hardening Steel—Carburizing, Nitriding or Carbonitriding? Kenneth Rose. *Materials and Methods,* v. 33, Feb. 1951, p. 62-64.

Relative merits and applicabilities. (J28, ST)

70-J. Ford Transmission Shafts Gas Carburized in Automatic Furnaces. *Industrial Heating,* v. 18, Feb. 1951, p. 216-220, 222, 224, 226, 228.

Equipment is diagrammed and illustrated. (J28, ST)

71-J. Electric Annealing Furnace Assures Uniform Grain Size of Seamless Copper Tubing. *Industrial Heating,* v. 18, Feb. 1951, p. 230, 232, 234.

Furnace in use by Viking Copper Tube Co., Cleveland. (J23, Cu)

72-J. Carbonitriding and Related Heat Treating Processes. M. Neumeyer. *Industrial Heating,* v. 18, Feb. 1951, p. 236, 238, 240, 242, 244.

Carbonitriding, gas carburizing, and clean hardening methods of heat treating steel. Furnace atmospheres, including gas generators and constituents used. (J28, J2, ST)

73-J. Bright Hardening, Carburizing and Carbonitriding. Harold Ipsen and R. Krogh. *Metal Progress,* v. 59, Feb. 1951, p. 232-238.

Theory and practice, equipment, applications and costs. (J28, ST)

74-J. Heat Treatment in Wartime Germany. *Metal Progress,* v. 59, Feb. 1951, p. 266, 268, 270, 272-273. (Condensed from "The Ferrous Metal Industry in Germany During the Period

1939-1945," George Patchin and Ernest Brewin, BIOS, Over-All Report 15.)
(J general, ST)

75-J. Carbonitriding Gains Wider Acceptance. E. J. Pavesic and A. E. Uitti. *Iron Age,* v. 167, Mar. 1, 1951, p. 101-104.

Carbonitriding as a means of case hardening results in big savings on large production runs. An endothermic career of gas is used in a compact furnace which combines low operating cost and high production with a minimum of handling. (J28, ST)

76-J. Austempering of Proving Rings With Minimum Distortion. Fred Heinzelman. *Metal Treating,* v. 2, Jan.-Feb. 1951, p. 4-5.

Procedure developed for proving rings of SAE 52100 steel. (J26, AY)

77-J. What's New in Heat Treating. Howard E. Boyer. *Steel Processing,* v. 37, Jan. 1951, p. 33-37, 42; Feb. 1951, p. 83-86.
(J general)

78-J. Homogenization of Cast Steels. Mehmet T. Aktutay and Philip C. Rosenthal. *Foundry,* v. 79, Mar. 1951, p. 100-105, 242-244.

Investigations indicate that for heavy-section steel castings, particularly higher-carbon material, the increased hardenability and better yield-tensile ratios obtained by homogenization heat treatment may warrant use of this process. Photomicrographs illustrate microstructures obtained. (J21, CI)

79-J. Annealing of Monel, Nickel and Inconel. II. Auxiliary Factors in Annealing. *Wire Industry,* v. 18, Feb. 1951, p. 133-134, 137.

Pyrometry and temperature control; protective atmospheres; purging; effect of cold work previous to annealing; effect of rate of cooling; grain-size control and its effect upon fabrication; and protection from contamination. (J23, Ni)

80-J. A Surface Effect on Extruded Lead and Its Alloys. R. C. Gifkins and H. C. Coe. *Metallurgia,* v. 43, Jan. 1951, p. 47-48.

In attempting to produce fully annealed specimens of Pb and Pb alloys for creep-test purposes, using the quality of X-ray back-reflection patterns as an annealing criterion, it was found that extruded samples do not appear to be fully annealed by the treatment used satisfactorily with rolled samples. The effect appears to be due to a very shallow surface layer which can be removed by a suitable etching technique. (J23, Q3, Pb)

81-J. Production Problems. I. Dimensional Changes in Gears and Pinions. *Iron and Steel,* v. 24, Feb. 1951, p. 51-54.

Changes in dimensions in machined components are frequently encountered after production heat treatment (case hardening). Example is increase in pitch diameter of up to 0.004 in. on gears and pinions. Heat treatment recommendations. 19 photomicrographs of 50-1000 magnification illustrate results. (J26, ST)

82-J. Carburization Using Sawdust. (In Russian.) A. Kochin. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Nov. 1950, p. 36-37.

Optimum conditions as determined by one plant which has used the sawdust of deciduous trees as its exclusive carburization medium for two years. Treatment of the sawdust before use and details of the carburization process. (J28)

83-J. Investigation of Quenching Diagrams by Means of the Braun Tube. (In German.) Yasumasa Isihara. *Technology Reports of the Tohoku University,* v. 14, no. 1, 1949, p. 77-88.

Details of electrical apparatus. Effects of carbon content and bar dimensions on the cooling curves of steel. (J26, ST)

84-J. Copper Tubes Spot Annealed in Deoxidizing Atmosphere. W. W. Swarthout. *Steel,* v. 128, Mar. 12, 1951, p. 84.

Procedure and equipment. The tubes are used for Freon condensers of refrigeration and air-conditioning equipment. (J23, Cu)

85-J. Good Carburizing Practice. VII. How to Select Case Depth and Refine the Case. VIII. Many Factors Produce Distortion. IX. Selective Carburizing Depends on Medium. X. Chemistry Vitally Affects Case Properties. T. A. Frischman. *American Machinist,* v. 95, Feb. 5, 1951, p. 128-131; Feb. 19, 1951, p. 138-141; Mar. 5, 1951, p. 106-109; Mar. 19, 1951, p. 138-141.
(To be continued.) (J28, ST)

86-J. Commercial Flame Hardening. Elmer J. Cox. *Welding Journal,* v. 30, Mar. 1951, p. 229-233.

Equipment and procedures of Pittsburgh Commercial Heat Treating Co. Generally applicable recommendations for flame hardening of steel by commercial heat treaters. (J2, ST)

87-J. The Manufacture of Harrow and Plough Discs. *Coke and Gas,* v. 13, Feb. 1951, p. 66-67.

Multiple-burner furnaceless heat treatment unit. (J general, T3, CN)

88-J. The Surface Hardening of Steel. Part II. Mechanism of the Carburizing Process and the Effect of Alloying Elements and Heat-Treat-

ment. G. T. Colegate. *Metal Treatment and Drop Forging,* v. 18, Feb. 1951, p. 63-70.

Mechanism of the carburizing process, and effect of alloying elements on properties and rate and depth of carburization. The different heat treatments followed before and after carburizing and their effect are also examined. (To be continued.) (J28, ST)

89-J. The Effect of Isothermal Treatment on the Mechanical Properties of Steel; With a Note on Solder Embrittlement. M. Douglas Jepson. *Metallurgia,* v. 43, Feb. 1951, p. 62-64, 81-82.

Compares isothermally transformed material (tempered in some cases) and quenched and tempered specimens. Results show the isothermal treatment to have an advantage, but the marked inferiority exhibited by the quenched samples tempered at temperatures below 300° C. was found to be due to embrittlement by the molten solder of the tempering bath.
(J26, Q general, ST)

90-J. Gear Hardner Loads and Unloads Automatically. Paul Good. *Iron Age,* v. 167, Mar. 22, 1951, p. 72-74.

Equipment used by Westinghouse Electric Corp. (J26, T7, ST)

91-J. Largest Automatic Gas Carburizing Installation at Warner Gear Plant. *Industrial Heating,* v. 18, Mar. 1951, p. 410-412, 414, 416, 418, 420.
(J28, ST)

92-J. Ford Camshafts Flame or Induction Hardened. *Industrial Heating,* v. 18, Mar. 1951, p. 422, 424, 426, 428, 430, 554, 556.

Macrographs and micrographs show structures obtained. Material is an alloy cast iron. (J2, CI)

93-J. Continuous Annealing of Strip Steel at Dominion Foundries & Steel, Ltd. W. R. Weir. *Industrial Heating,* v. 18, Mar. 1951, p. 457-458, 460, 462, 464, 466, 468, 470, 472, 564, 566, 568, 570.

Construction, operational features, and the results obtained. Details concerning furnace atmosphere and annealing temperatures. (J23, CN)

94-J. The Heat Treatment of Narrow Steel Strip by the Electric Direct Resistance Method. O. C. Trautman. *Wire and Wire Products,* v. 26, Mar. 1951, p. 219-221.

Method which has been in use for the past two years. This new process produces strip which has higher physical properties than can be obtained by furnace heat treating.
(J2, ST)

95-J. The Solar Story. *Western Machinery and Steel World,* Mar. 1951, p. 78-79.

Use of gas-fired furnaces by Solar Aircraft, San Diego, in heat treatment of high-temperature stainless steel and superalloy aircraft engine manifolds. (J general, SS, SG-h)

96-J. Steel Production in Mid-America. Arthur Q. Smith. *Industrial Gas,* v. 30, Mar. 1951, p. 14-15, 28.

Gas-fired furnaces for billet heating, wire patenting, and hot-dip galvanizing at Sheffield Steel Corp., Kansas City, Mo., Sand Springs, Okla., and Houston, Tex.
(J21, J25, L16, CN, Zn)

97-J. Localized Flame Hardening of Steel Cutters Reduces Warpage. A. P. Alexander. *Materials & Methods,* v. 33, Mar. 1951, p. 76.

How satisfactory hardness was obtained and rejects reduced by selective treatment of laminated steel. The laminate consisted of layers of low-carbon and high-carbon (0.90%) steel. (J2, ST)

98-J. Brass Strip Annealed and Cleaned Continuously. *Steel,* v. 128, Mar. 26, 1951, p. 76-77.

New integrated automatic system at American Brass Co.'s new sheet and strip mill in Buffalo.
(J23, L12, Cu)

99-J. Flame Hardening; Practical Applications to Steels and Cast Iron. *Iron and Steel,* v. 24, Mar. 1951, p. 107-110.
(J2, CI, ST)

100-J. Stress Relief and Allied Problems in Magnesium-Alloy Castings. R. J. M. Payne. *Foundry Trade Journal,* v. 90, Mar. 8, 1951, p. 263-265.

Previously abstracted from *Journal of the Institute of Metals.* See item 49-J, 1951. (J1, Mg)

101-J. The Study of Timepiece Springs. II. (In Japanese.) Tetsutaro Mitsuhashi and Manabu Ueno. *Journal of Mechanical Laboratory,* v. 4, Sept. 1950, p. 174-179.

Heat treatment procedures for improving fatigue limit. Refers to 1948 articles in *Metal Progress.*
(J26, Q7, T7, ST)

102-J. Study on Application of Material. IV. The Mechanism of Solid-State Carburization in the A-A_3 Range. (In Japanese.) Hisao Matsumoto and Motoici Kitada. *Journal of Mechanical Laboratory,* v. 4, Sept. 1950, p. 191-195.

Results of theoretical and experimental study, using various carburizers. (J28, N8, ST)

103-J. Study on Application of Material. V. Sawdust Carburization. (In Japanese.) Hisao Matsumoto and Motoici Kitada. *Journal of Mechanical Laboratory,* v. 4, no. 6, Oct. 1950, p. 236-239.

Results of study of use of sawdust as carburizing agent. (J28, ST)

104-J. Study on Application of Material. VI. Mechanism of Grain Refining by Induction Heating (Study of High-Frequency Induction Heating No. 2.) (In Japanese.) Hisao Matsumoto and Kenichi Yamashita. *Journal of Mechanical Laboratory,* v. 4, no. 6, Oct. 1950, p. 240-245.

Results for carbon steel are tabulated, charted, and illustrated by photomicrographs. (J2, CN)

105-J. Heat Treatment of Spring Steels for Watches and Clocks. (In Japanese.) Tetsutaro Mitsuhashi. *Journal of Mechanical Laboratory,* v. 4, no. 7, Oct. 1950, p. 257-262.

Scaling and decarburization, grain growth characteristics, softening speed on tempering, and hardness change on isothermal transformation were studied for spring steels 0.4 mm. thick and containing 0.94 and 1.19% C.
(J26, N3, SG-b, CN)

106-J. Mass Marquenching. W. B. Cheney and W. C. Hiatt. *Steel Processing,* v. 37, Mar. 1951, p. 135-139.

See abstract of "Mass Marquenching Speeds Gear Output," *Steel,* item 44-J, 1951. (J26, T7, AY)

107-J. Molybdenum Can Replace Chromium in Bearing Steels. A. S. Jameson, A. D. Ellis, and G. F. Meyer. *Iron Age,* v. 167, Apr. 5, 1951, p. 102-107.

By replacing 1-1.5% Cr with ½% Mo, a satisfactory substitute has been developed for the standard E52100 steel. Heat treating and annealing cycles are shorter for Mo steels. Experimental Mo-B bearing heats were also tested. Hardness vs. tempering-temperature curves, also hardenability data, for various compositions. (J general, AY, SG-c)

108-J. Effects of Some Solution Treatments Followed by an Aging Treatment on the Life of Small Cast Gas-Turbine Blades of a Cobalt-Chromium-Base Alloy. I. Effect of Solution-Treating Temperature. C. Yaker and C. A. Hoffman. *National Advisory Committee for Aeronautics,* Technical Note 2320, Mar. 1951, 37 pages.

Solution treatments at 2350, 2250, and 2100° F. followed by aging at 1500° F. Includes tables, graphs, and micrographs of results.
(J27, Co, Cr)

109-J. Continuous Annealing of Strip Steel at Dominion Foundries and Steel Limited. W. R. Weir. *American Iron and Steel Institute,* "Technical Committee Activities," 1950, p. 217-232.

Previously abstracted from *Industrial Heating.* See item 93-J, 1951. (J23, CN)

110-J. Controlled Atmospheres. W. F. Ross. *Canadian Metals,* v. 14, Mar. 1951, p. 12, 14, 50.

How specific properties can be achieved by heat treatment in controlled atmospheres of special composition. Carburizing and nitriding are among the methods described. (J2, J28)

111-J. Flame Hardening of Cast Iron Surfaces. (In German.) Hans Wilhelm Grönegress. *Stahl und Eisen,* v. 71, Mar. 1, 1951, p. 246-252.

Development, present status, and future possibilities. Types of cast iron that can be hardened by this method. 27 ref. (J2, CI)

112-J. The Efficiency of Continuous Strip-Annealing Furnaces. (In German.) O. Junker. *Metall,* v. 5, Mar. 1951, p. 106-107.

Mathematics of determining efficiency. (J23)

113-J. Spoiled Tool Steels Can Be Reclaimed. R. P. Seelig. *Iron Age,* v. 167, Apr. 12, 1951, p. 97-101.

Six toolsteels were deliberately spoiled, either by quenching in the wrong medium or at incorrect temperatures. Some attained desired hardness values and bend strengths after reheating and retempering. Basic technique and required precautions. (J26, Q29, TS)

114-J. Pearlitic Malleable Irons Can Be Successfully Surface Hardened. S. H. Bush, F. B. Rote, and W. P. Wood. *Materials & Methods,* v. 33, Apr. 1951, p. 70-72.

How hard, wear resistant surfaces can be produced by flame or induction hardening, thus increasing greatly the number of possible applications of the pearlitic malleable irons. Includes photomicrographs and hardness vs. depth curves.
(J2, CI)

115-J. A Note on the Measurement of Stress Relief. C. R. Tottle. *Metallurgia,* v. 43, Mar. 1951, p. 148-150.

Adaptation of a creep testing machine for measurement of stress relief during a heat treatment cycle, enabling stress, extension, and temperature to be plotted against time on the same graph. A high-duty gray cast iron, an ordinary gray cast iron, a cast steel, and a 66-34 cast brass are used to illustrate the principle. (J1, Q3, CI, Cu)

116-J. The Surface Hardening of Steel. Part III. Pack Carburising. G. T. Colegate. *Metal Treatment and Drop Forging,* v. 18, Mar. 1951, p. 103-110, 118.

Effects of time and temperature upon depth of case in pack carburizing, and causes contributing to exfoliation and formation of soft spots. Carburizing compounds, retardants

and the mechanism of reactivation. 12 ref. (To be continued.) (J28, ST)

117-J. Effect of Initial Heating Temperature on the Mechanical Properties of Ni-Cr-Mo Steels. J. A. Wheeler, V. Kondic, and T. Ko. *Journal of the Iron & Steel Institute,* v. 167, Mar. 1951, p. 301-308.

Effect of high austenitizing temperature on tensile properties of air-quenched Ni-Cr-Mo steels. Transformations and precipitations involved were also investigated. (J22, Q27, N8, AY)

118-J. Development of Methods for Gas-Flame Treatment of Metals. (In Russian.) A. N. Shashkov. *Avtogennoe Delo* (Welding), v. 21, Dec. 1950, p. 5-7.

Progress of the All-Union Institute of Scientific Research on flame heat treatment of metals, including both processes and equipment. (J2)

119-J. Wire Rope Manufacture. Arthur Q. Smith. *Industrial Gas,* v. 29, Apr. 1951, p. 3-6.

Gas-fired heat treating equipment used by Union Wire Rope Co., Kansas City, Mo. (J general, ST)

120-J. Good Carburizing Practice. (Concluded.) **XI. How to Control Carburizing Equipment. XII. How to Measure Cast Depth.** T. A. Frischman. *American Machinist,* v. 95, Apr. 2, 1951, p. 92-95; Apr. 16, 1951, p. 140-142.

Poor stress distribution within the case and decarburization are among faults to be overcome. Accepted methods for determining hardenability of steel and devices for controlling dew point of gases. Final installment: details of various methods and applications for case-depth measurement. (J28, ST)

121-J. Embrittling Effect of Steam on Stainless at Elevated Temperatures. Carl A. Zapffe and F. E. Landgraf. *Steel,* v. 128, Apr. 30, 1951, p. 54-57, 81-82.

Hardened steels which endure a full bend after quenching from a dry atmosphere fail at a relatively low bend angle if steam is admitted to the heat treating furnace. This is specifically true of types 410 or 403, designed for service in steam turbines. The effect is extremely rapid. Causes and cures of this H_2 sensitivity. (J26, Q23, SS)

122-J. Continuous Annealing Arousing Industry Interest. W. R. Weir. *Steel,* v. 128, Apr. 30, 1951, p. 68, 70, 72, 74, 84.

Process in which a single strand of steel is annealed and cooled in less than 2 min.—although in use for at least 10 years—has just recently received serious consideration from cold rolled steel producers. (J23, ST)

123-J. Some Aspects of Annealing Atmospheres for Tin Plate Strip. J. R. Trimble and J. E. Hill. *Iron and Steel Engineer,* v. 28, Apr. 1951, p. 70-73; disc. p. 73.

Shows that annealing atmospheres may have a very important effect on corrosion resistance and life of tinplate coatings. (J23, Sn, CN)

124-J. Engineering Properties of Iron Castings Can be Improved by Heat Treatment. C. E. Herington. *Metal Treating,* v. 2, Jan.-Feb. 1951, p. 6-7; Mar.-Apr. 1951, p. 6-9.

(Based on articles of same title in *Materials & Methods.* See item 5-J, 1951. (J26, Q general, CI)

125-J. Suggested New Approach to the Mechanism and Effects of Solution Treatment & Aging on Metal-Alloy Wires & Strip. C. P. Bernhoeft. *Wire Industry,* v. 18, Apr. 1951, p. 371-374, 377.

A new theory mainly based on physical chemistry, and applicable to other products besides alloy strip and wire. (J27)

126-J. Nitriding; Developments and Applications for Steel. R. W. Allott. *Iron and Steel,* v. 24, Apr. 1951, p. 145-148.

An illustrated review. (J28, ST)

127-J. Local Stress-Relief Annealing. (In German.) R. Schnabbe, R. Mailänder, and H. J. Wiester. *Brennstoff-Wärme-Kraft,* v. 3, Mar. 1951, p. 79-85.

Experiments with a large welded cylindrical vessel show that local stress-relief annealing is less effective than annealing the entire drum, but that local annealing is satisfactory for most ordinary purposes, residual stresses being relatively small. Method of experimentation and data. (J23, ST)

128-J. An Investigation on Boron-Treated Steels. I. On the Hardenability of Boron-Treated Medium-Carbon Steels, Especially the Effect of Nitrogen Content in Steels. (In English.) Yunoshin Imai and Hikotaro Imai. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Apr. 1950, p. 260-269.

Maximum hardenability was obtained by addition of about 0.003% B, being decreased sharply upon further increase of boron. Effects of N_2 and of deoxidation or denitriding by Al or TI, prior to B addition, were determined. 11 ref. (J26, B, CN)

129-J. Oldsmobile Axle Shafts Are Heat Treated Automatically. *Industrial Heating,* v. 18, Apr. 1951, p. 598-602, 604, 606, 748, 750, 752.

Equipment and procedures. Material is SAE 1330 steel. (J general, T21, CN)

130-J. Heat Treating of Aircraft Components Economized by Methodical Purchasing of Pyrometer Supplies. Harry James. *Industrial Heating,* v. 18, Apr. 1951, p. 630, 632, 634, 636.

Procedures and equipment. Temperature measurement and control. Annealing steel and brass and brazing Cu and Ag.
(J23, K8, S16, ST, Cu, Ag)

131-J. Motorcycle Parts Annealed at Harley-Davidson With Double-End Oven. *Modern Machine Shop,* v. 23, May 1951, p. 220.
(J23, ST)

132-J. Age Hardenable High-Nickel Alloys. W. A. Mudge. *Metal Progress,* v. 59, Apr. 1951, p. 529-536.

Details of aging treatments, and of mechanical and physical properties of three monels, Duranickel, Permanickel, and Inconel X.
(J27, Q general, P general, Ni)

133-J. Heat Treatment of Age Hardenable High-Nickel Alloys. *Metal Progress,* v. 59, Apr. 1951, p. 528B.

A data sheet. (J27, Ni)

134-J. Induction Heater Hardens 15 Different Parts. *Iron Age,* v. 167, May 3, 1951, p. 110.

Fifteen different parts are currently being processed with a single induction-heating generator at Oliver Corp., Charles City, Iowa, at a saving of nearly half of previous heat treating costs. (J2)

135-J. An Investigation on Boron-Treated Medium-Carbon Steels. Yunoshin Imai and Hikotaro Imai. *Engineers' Digest,* v. 12, Apr. 1951, p. 115-117. (Condensed.)

Previously abstracted from *Science Reports of the Research Institutes, Tohoku University.* See item 128-J, 1951. (J26, B, CN)

136-J. The Relative Effects of Chromium and Silicon Contents on Rate of Anneal of Black-Heart Malleable Iron. Part I. First Stage Annealing. J. E. Rehder. *American Foundrymen's Society,* Preprint 51-51, Apr. 1951, 6 pages.

Determination in the first, or primary carbide decomposition stage, shows that Cr neutralizes the graphitizing effect of 4-5 times its weight of Si. The necessary changes in annealing practice can be determined from charts. Includes photomicrographs. (J23, N8, CI)

137-J. Malleable Cast Irons—Annealing Furnaces and Atmosphere. O. E. Cullen and R. J. Light. *American Foundrymen's Society,* Preprint 51-62, Apr. 1951, 6 pages.

Furnace designs and atmosphere control for blackheart malleable cast iron. History of the process. (J23, CI)

138-J. Armour Plate—Continuous Treatment of Lighter Grades. Horace Drever. *Iron and Steel,* v. 24, May 1951, p. 189-192.

Continuous heat treatment of armour plate under 6 in. thick. Principal operations are hardening, quenching and tempering.
(J26, J29, CN)

139-J. Heat Treatment of Light-Alloy Equipment and Material. (In French.) Paul Penel. *Revue de l'Aluminium,* v. 28, Jan. 1951, p. 31-38.

Equipment and procedures for the above for both salt-bath and atmospheric heat treatment. Includes details of calculations. (To be continued.) (J2, AY, Mg)

140-J. Thermal Treatment of Light Alloys. Practical Suggestions. (In French.) Paul Penel. *Revue de l'Aluminium,* v. 28, Mar. 1951, p. 105-115.

Concludes series. (J general, Al)

141-J. Physics of Metals. Homogenization and Dehomogenization in Steels. (In French.) L. Colombier. *Métaux & Corrosion,* v. 25, Dec. 1950, p. 295-307.

Discussed from the metallurgical point of view. Experimental results for several different types of steel. Includes phase diagrams and photomicrographs. (J21, ST)

142-J. Flame Hardening and Tempering of Steel. (In German.) Hans Bühler and Hans Wilhelm Grönegress. *Stahl und Eisen,* v. 71, Mar. 29, 1951, p. 343-347.

Test results on nine steels show that proper methods and equipment permit hardening and tempering of steel bars up to 80 mm. in diam. without furnaces. Advantages over furnace hardening. 13 ref.
(J2, J29, ST)

143-J. Accuracy of Calculation of Carbon Penetration in Large-Scale Carburization of Steels. (In German.) Adolf Slattenschek. *Archiv für das Eisenhüttenwessen,* v. 22, Mar.-Apr. 1951, p. 117-130.

Validity of an equation for the above was investigated on the basis of H. Schrader and R. Monfang's data. Anomalous deviations from the theoretical results were found to be caused by overcarburization or decarburization. Careful experiments produced results which agreed closely with computed ones. 21 ref.
(J28, ST)

144-J. The Bright-Annealing of Electrolytic Copper Wire and Strip. (In Dutch.) M. T. Den Haan and J. J. M. Roos. *Smit Mededelingen,* v. 6, Jan.-Mar. 1951, p. 7-12.

Procedures and equipment of Dutch plant. (J23, Cu)

145-J. Heat Treatment of Boiler Steels. *American Machinist,* v. 95, May 14, 1951, p. 173.

A data sheet. (J general, T25, ST)

146-J. Machine for Hardening Rail Ends Developed on the Southern. *Railway Engineering and Maintenance,* v. 47, May 1951, p. 453-455.

Specialized flame hardening equipment and its development. Results obtained and capacity of the machine. (J2, CN)

147-J. Annealing and Carbon Restoration Handled in One Operation. *Steel,* v. 128, May 14, 1951, p. 97.

In one continuous furnace operation, bars are annealed and carbon restored to their surface at Union Drawn Steel Div., Republic Steel Corp., Massillon, Ohio. This furnace is regarded as one of the latest developments in the steel industry. (J23, ST)

148-J. The Surface Hardening of Steel. Part IV. Pack Carburizing Practice. G. T. Colegate. *Metal Treatment and Drop Forging,* v. 18, Apr. 1951, p. 163-170.

Materials and designs available for containers and factors which promote their deterioration. The advantages of pack carburizing and methods of packing components; furnace-heating methods and recommendations for efficient furnace utilization. (To be continued.) (J28, ST)

149-J. Production and Metallurgical Characteristics of Mining Hollow Drill Steel in Australia. Daniel Clark. *Metallurgia,* v. 43, Apr. 1951, p. 161-166.

Heat treatment and types of failure encountered in service. Importance of forging operation; hardening of bits and shanks; fatigue failures; service failures; proposed testing station. (J26, F22, S21, TS)

150-J. Principles of New Heat Treating Processes for Steels and a New Martensite Diagram. (In German.) Roland Mitsche. *Berg-und Hüttenmännische Monatshefte,* v. 96, Feb. 1951, p. 25-28.

New methods of transforming steels and a new concept of the martensite stage. Includes time-temperature-transformation diagrams. (J26, N8, ST)

151-J. Why a Commercial Heat Treater Prefers Gas. Richard W. Thorne. *Industrial Gas,* v. 29, May 1951, p. 12-13, 28-30.

Opinions of president of Bennett Steel Treating Co., Newark, N. J. (J general)

152-J. Cyclic Annealing Direct From Forge Operations Produces Outstanding Results at Ford Plant. *Industrial Heating,* v. 18, May 1951, p. 790-792, 794, 796, 798, 800, 802, 804, 950.

New technique of annealing forgings rapidly and uniformly by process which utilizes the residual heat in forgings directly from the press. Driving ring gears and stem-type driving pinions are iso-thermal-annealed in the salt-bath furnace. (J23, AY)

153-J. High Speed Reheating of Seamless Steel Tubes. H. W. Cox. *Industrial Heating,* v. 18, May 1951, p. 837-840, 842, 844.

Use of radiation pyrometry for successful control of a new high-gradient heating process. The basic principle of this type of heating and the furnace installation itself. (J general, S16, ST)

154-J. Carbonitriding Produces Hard Case at Lower Temperatures. Samuel Damon. *Materials & Methods,* v. 33, May 1951, p. 64-65.

When large quantities of small parts can be treated simultaneously, dry cyaniding is said to have advantages of lower cost, less distortion, and cleaner, safer operation. Typical application to cold drawn low-carbon steel tubing. (J28, ST)

155-J. Metallurgical Considerations on the Gaseous Annealing of Whiteheart Malleable. Fritz Schulte. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Apr. 1951, p. 883-901; disc., p. 902-904.

Critical analysis of the two processes of importance in the above: decarburization and graphitization. (J23, N8, CI)

156-J. Gaseous Annealing of Malleable Castings; The Present Position. P. F. Hancock. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Apr. 1951, p. 905-922; disc., p. 923-924.

Details of equipment and procedures. Divided into sections on whiteheart and blackheart types. (J23, CI)

157-J. An Application of the Absolute Reaction Rate Theory to Some Problems in Annealing. F. Wm. Cagle, Jr., and Henry Eyring. *Journal of Applied Physics,* v. 22, June 1951, p. 771-775.

Absolute rate theory is combined with molecular models in the study of annealing of metals and of glass. It is thus possible to obtain expressions which are in close agreement with experimental data. Both the observed first-order data for metals and the second-order data for glass are predicted in this way. 16 ref. (J23)

158-J. Flame Hardening. E. F. Green. *Industry & Welding,* v. 24, June 1951, p. 48-49, 51-53.

The process and its applications. Materials (steels, cast irons, malleable irons), mechanical equipment, and heating equipment. (To be continued.) (J2, ST, CI)

159-J. Control Salt Bath When Heat-Treating High-Speed Steel. J. G. Morrison. *Iron Age,* v. 167, May 31, 1951, p. 63-66; June 7, 1951, p. 110-113.

Depending on analysis, condition, and method of rectification, salt baths may have varying effects on high speed steel during heat treatment. A simple test helps predict whether decarburization or carbon pickup will occur, and whether the steel is unduly soluble in the bath. (J2, TS)

160-J. Developments in Production Practice: Production Applications of Induction Heating. *PERA Bulletin,* v. 4, May 1951, p. 317-323.

Advantages of induction heating, elementary principles, costs, and applications to hardening operations, brazing and soldering, forging, stoving, and dielectric heating. 80 ref. (J2)

161-J. The Homogenisation of Steel Castings and Its Influence on the Mechanical Properties. *Metal Treatment and Drop Forging,* v. 18, Apr. 1951, p. 145-154; May 1951, p. 195-200.

Part of the research program of the Steel Castings Div. of the BISRA. First section: results obtained on normal-quality castings in the form of keel blocks or cloverleaf test blocks of plain carbon and low-alloy steels produced by the basic electric arc or acid high-frequency processes. Second part: effects of homogenizing plain carbon steels, made in acid electric arc furnaces and cast in the form of cloverleaf test blocks. They had unsatisfactory tensile properties after the usual heat treatment. (J21, Q general, CI)

162-J. Induction Hardening and Brazing. R. J. Brown. *Metal Treatment and Drop Forging,* v. 70, May 1951, p. 214-221.

Practical applications of the high-frequency method of heating with reference to actual production applications as distinct from laboratory experiments. Equipment, procedures, and brazing materials. Economics for various applications. (J2, K8)

163-J. The Metallurgy of Heat-Treatment of Whiteheart Malleable Iron With Emphasis on Gas Malleabilizing. (In German.) Fritz Schulte. *Giesserei,* v. 38 (new ser., v. 4), May 3, 1951, p. 197-205.

See abstract of "Metallurgical Considerations on the Gaseous Annealing of Whiteheart Malleable," *British Cast Iron Research Association Journal of Research and Development;* item 155-J, 1951. (J23, N8, CI)

164-J. Copper and Copper Alloys. 3. Stress Aging of Brass. W. G. R. de Jager (In German.) *Metalen,* v. 6, May 1951. p. 154-156.

Effect of temperature and time of stress-relief treatment on properties of brasses, bronzes, and other Cu alloys. Includes extensive tabular data on resulting mechanical properties. (J1, Q general, Cu)

165-J. Heat Treating Lead-Bronze Bearings Above the Melting Point of Lead. (In German.) A. Röhenbeck. *Metall,* v. 5, May 1951, p. 201-203.

Experiments were made with sleeve bearings, 1 mm. and 6.5 mm. thick, heated at 250, 680, and 830° C. in order to find means of adapting the sleeve to a higher-carbon or alloyed, and therefore stronger, backing steel. Photomicrographs show effects of different temperatures on structure of the bearing. (J general, Pb, Cu, SG-c)

166-J. Graphitization of the Surface Layer of Steel. (In German.) R. Oettel. *Metalloberfläche,* ser. A, v. 5, May 1951, p. 74-75.

Purpose of experiments was to combine the high-strength properties of steels with the good frictional and wear properties of cast iron. Conditions required to obtain, or to avoid, the formation of elementary carbon and the method of confining graphitization to the surface. (J26, ST)

167-J. Experiences in the Construction of Pipe Lines With Emphasis on Heat Treating. (In German.) H. Kirshfield. *Schweissen und Schneiden,* v. 3, Apr. 1951, p. 126-128.

Factors that affect the quality of steel pipe welds and the proper procedure for stress-relief annealing and for normalizing. (J1, J24, CN)

168-J. Plant Results From a Wire-Patenting Furnace Heated With City Gas. (In German.) Franz Domes. *Stahl und Eisen,* v. 71, May 10, 1951, p. 512-516; disc., p. 516.

Comparison of a coal-fired with a gas-fired furnace shows that the heat consumption of the latter is 78% less and the output 45% greater than the former. Results from the gas-fired furnace were also compared with published data. (J25)

169-J. Calculation of Intensity of Diffusion Dispersion of X-Ray During Aging of Alloys. (In Russian.) Yu. A. Bagaryatskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Mar. 1, 1951, p. 45-48.

Proposes a new method. Theoretical bases and equations used, and technique of calculation. Application of this calculation to Al-Cu and Al-Mg alloys in different stages of aging showed the validity of the proposed method. 13 ref.
(J27, N7, Al, Cu, Mg)

170-J. Co-Deposited Stopoff Conserves Tin. E. S. Cee. *Iron Age,* v. 167, June 14, 1951, p. 86-88,

Pure Sn is used to form a protective barrier against the furnace atposphere in selective hardening of parts requiring localized case hardening. A co-deposited alloy plating of 5-15% Sn and 85-95% Cu makes an effective substitute, greatly reducing Sn consumption and also being cheaper. (J28, L17, ST, Cu)

171-J. High Speed Quenching Oils Increase Surface Hardness. W. J. Reitze. *Steel,* v. 128, June 18, 1951, p. 72-74.

Shows that quenching efficiencies of these oils impart additional hardness to steels, especially to low-carbon steels, permitting their use in many places formerly requiring alloy grades. (J2, ST)

172-J. Recent Heat Treatment Installations. *Metallurgia,* v. 43, May 1951, p. 221-233.
(J general)

173-J. The Heat Treatment of Aluminum Alloys. J. Crowther. *Metallurgia,* v. 43, May 1951, p. 243-247.

Based on Wilm's discovery that an Al alloy containing 4% Cu and ½% Mg hardened on standing at room temperature after quenching from 500° C., a number of alloys were developed giving improved mechanical properties—some after precipitation at elevated temperatures. Treatment of certain types of these alloys. (J27, Al)

174-J. Cementation by Carbon and Nitrogen. (In French.) J. Pomey. *Métaux Corrosion—Industries,* v. 26, Feb. 1951, p. 49-80.

Previously abstracted from *Revue de Métallurgie,* v. 47, Oct. 1950, p. 727-738.

175-J. Study of Electron Diffraction of the Carburization of Iron. II. Action of the Mixture CO+H_2. (In French.) Jean-Jacques Trillat and Shigueo Oketani. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 232, Mar. 12, 1951, p. 1116-1118.

Two cases were studied: carburization in pure CO and in CO+H_2 mixtures. Mechanisms of both processes. (J28, Fe)

176-J. Annealing of Whiteheart Malleable Cast Iron. (In French.) G. Joly. *Métaux Corrosion—Industries,* v. 26, Jan. 1951, p. 3-9.

Factors in the transformation of white cast iron into whiteheart malleable Fe, such as oxidation agents, temperature of annealing, chemical composition of metal, thickness of casting, etc. Particularly, the mechanics of decarburization, rate of dissolution of cementite, etc., are investigated. (J23, CI)

177-J. Heat Treating Engine Parts. *Industrial Gas,* v. 29, June 1951, p. 8-10.

Use of gas in heat treating marine diesel engines at Nordberg Mfg. Co., Milwaukee. (J general, ST)

178-J. New Quenching Methods Avoid Cracking—Improve Performance. J. H. Chapman. *Metal Treating,* v. 2, May-June 1951, p. 4-5.

Previously abstracted from original in *Western Metals.* See item 170-J, 1950. (J26, ST)

179-J. Heat Treatment of Plastic Molds. David R. Edgerton. *Metal Treating,* v. 2, May-June 1951, p. 9-11. (Reprinted from *Heat Treating Hints,* Lindberg Engineering Co., Chicago.)

Recommendations for heat treatment of molds for plastic articles. These cover the four general grades which are used: plain-carbon and alloy carburizing steels; through-hardening alloy steels; and stainless and heat-resistant steels.
(J general, T5, ST)

180-J. Large Scale Production Heat-Treatment at the Standard Motor Co., Ltd., Banner Lane Works, Coventry. L. H. Williams. *Metal Treatment and Drop Forging,* v. 18, June 1951, p. 257-269, 271.

Equipment and procedures.
(J general, A5, ST)

181-J. Hardenability and Heat Treatability of High-Grade Structural Steels. (In Czech.) Frantisek Sicha. *Hutnické Listy,* v. 6, Feb. 1951, p. 58-70.

A simple experimental method based on a survey of the world's technical literature and the author's experiments. Influence of steel composition and method of deoxidation on grain size was determined statistically. Results indicate that Czechoslovak structural steels of the same austenitic grain size possess greater hardenability than American steels. A new method of calculating hardenability from chemical composition and austenitic grain size is proposed, based on the results of statistical analysis of numerous Jominy tests. 22 ref. (J26, ST)

182-J. A Study of Natural Aging and the Application of Tests for Weldability of Steels. (In Czech.) Frantisek Poboril and Frantisek Sicha. *Hutnické Listy,* v. 6, Apr. 1951, p. 158-165.

By long-time tests of natural aging of low-carbon steels quenched

in water from just below the AC_1 point, the existence of precipitation hardening was demonstrated. Other tests were made on natural aging following cold deformation. This process resulted in only a small increase in hardness. Statistical evaluation of results of comparative tests on weldability of 125 low-carbon steels showed that aging after thermal treatment and after cold deformation gives fundamentally different results for a number of steels. (J27, K9, ST)

183-J. Wire Annealing Furnace Fits Low Headroom. W. J. Krailing. *Iron Age,* v. 168, July 12, 1951, p. 93-95.

Special wire and rod annealing furnace for brass mill designed with a pan-pull transfer car loading system to eliminate overhead handling. Fork-lift trucks transport the coils and load the pans. (J23, Cu)

184-J. Boron Steels in the Present Emergency. P. R. Wray. *Steel,* v. 129, July 2, 1951, p. 78-82.

Initial production heats of five new series of lean-alloy "needled" structural steels show hardenability exceeding laboratory predictions, confirming experiences with thousands of tons of World War II analyses. Hardenability data are charted. (J26, ST)

185-J. Aging of Steel and Its Relationship to Oxygen and Nitrogen. Ulrich Engelbert. *Australasian Engineer,* Apr. 7, 1951, p. 73-79.

The phenomenon of aging or, more precisely, the quench and strain aging of steel in relation to its O_2 and N_2 content. Emphasizes problems of precipitation and segregation in mild steels. Mentions briefly steelmaking methods designed to avoid susceptibility of mild steel to aging. 21 ref. (J27, N7, CN)

186-J. Carbo-Nitriding. *Iron and Steel,* v. 24, June 1951, p. 232.

Brief description of the process; includes furnace diagram. (J28, ST)

187-J. Heat Treatment in the Production Line. *Machinery Lloyd* (Overseas Ed.), v. 23, June 9, 1951, p. 100-103, 105, 107, 109.

Equipment for dielectric, induction, electric resistance, and gas heating in the form of a "push-button" machine which can be brought into the workshop alongside the machine tool and which can be tended by unskilled labor. (J general)

188-J. Present-Day Ideas on the Annealing of Special Steels Before Machining. (In French.) M. Remy. *Circulaire d'Informations Techniques,* v. 8, No. 2, 1951, p. 193-218.

Theoretical and practical aspects. Data on a variety of carbon, alloy, and stainless steels, are charted. Photomicrographs and 16 ref. (J23, CN, AY, SS)

189-J. Influence of Moderate Cold Working on the Kinetics of Hardening of Solid Solutions of Aluminum. (In French.) Aurel Berghezan. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Apr. 23, 1951, p. 1560-1562.

As applied to cold working of aged supersaturated solid solutions of Al. Results indicate, contrary to the usual theory that cold working accelerates hardening, that there is a threshold of cold working, below which this acceleration does not take place. (J27, Al)

190-J. Thermal Treatment Accompanying Cementation. (In French.) J. Pomey. *Metaux: Corrosion-Industries,* v. 26, Mar. 1951, p. 97-125.

Previously abstracted from *Revue de Metallurgie.* See item 64-J, 1951. (J28, ST)

191-J. Steels for Surface Hardening. (In French.) Hans Buhler. *Métaux: Corrosion-Industries,* v. 26, Apr. 1951, p. 179-183. (Translated from *Werkstatt und Betrieb,* v. 83, No. 9, 1950, p. 406-408.)

Present status in Germany. (J28, ST)

192-J. The Present Status of Annealing Malleable Iron in Gas Atmospheres. (In German.) P. F. Hancock. *Giesserei,* v. 38 (new ser., v. 4), May 31, 1951, p. 245-255.

Limited to British procedures and equipment. (J23, CI)

193-J. Role of Boron Steels in Present Emergency. P. R. Wray. *SAE Journal,* v. 59, July 1951, p. 46-52.

Previously abstracted from *Steel.* See item 184-J, 1951. (J26, ST)

194-J. The Growth of Aluminum Alloys From Annealing and Use at Elevated Temperatures. (In German.) A. Leon. *Berg-und Hüttenmännische Monatshefte,* v. 96, May 1951, p. 118-119.

Briefly reviews published experiments. 5 ref. (J23, Al)

195-J. Carburizing, Gas-Carburizing; A Specific Treatment for Steel. (In Dutch.) C. H. Luiten. *Smit Mededelingen,* v. 6, Apr.-June 1951, p. 43-47.

Development and practical application of case hardening processes. Pack carburizing, salt-bath carburizing, cyaniding and nitriding; gas carburizing, carbonitriding, and nitriding as well as surface hardening by means of special compounds. Includes illustrations of case-hardening furnaces. (J28, ST)

196-J. Hardening Compound Carburizes, Nitrides and Chromizes Steel. E. M. Ellsworth. *Materials & Methods,* v. 34, July 1951, p. 86-88.

Recently developed fast acting steel-hardening compounds that harden cutting edges and increase wear resistance by three-way action. Use, advantages, and limitations of the compounds. (J28, L15, CN)

197-J. Boron Steels for Constructional Parts and for Carburizing. Porter R. Wray. *Metal Progress,* v. 60, July 1951, p. 52-55.

For the majority of applications for the constructional alloy steels, boron can probably replace a sizable quantity of Ni, Cr, Mo, and other critical alloys where their presence is necessary only for adequate hardenability. Includes hardenability and workability data. (J26, J28, Q23, AY)

198-J. Nitriding Stainless Steels for Better Wear Resistance. Sidney Low. *Steel,* v. 129, Aug. 6, 1951, p. 82, 84, 87.

Cycle of 40 hr. at 1000° F., in dissociated and ionized ammonia, following heat treatment, removes oxide layer by nascent hydrogen and is adaptable to conventional furnace equipment. (J28, SS)

199-J. Machine Cuts Heat Treat Furnace Loading Costs. W. G. Patton. *Iron Age,* v. 168, Aug. 9, 1951, p. 68-70.

An automatic loading machine which is successfully feeding a single heat treating furnace with small parts of uniform size on a 24-hr. continuous basis. Working with screw-machine parts and assorted small stampings, the machine has eliminated fatigue in furnace loading and effected marked labor savings. Estimates place the increase in furnace output at 10%. (J general)

200-J. Which Surface Hardening Process? Lester Spencer. *Product Engineering,* v. 22, Aug. 1951, p. 157-162.

Discusses factors to be considered in answering above question. Tables and graphs give data on surface hardening of ferrous materials by different methods. Large chart gives basic characteristics, hardness range, depth of case, typical applications, steels used, heat treatments, advantages, and disadvantages of the seven processes covered. (J28, ST)

201-J. A Controlled System of Heat Treating. *Magazine of Tooling and Production,* v. 17, Aug. 1951, p. 140, 145.

Process which uses a heat treating furnace, a loader, and a quench tank, all in one compact unit. (J26)

202-J. The Function of Energizers in Pack Carburizing. A. Hultgren. *Journal of the Iron and Steel Institute,* v. 168, July 1951, p. 245-259.

A number of small-scale pack-carburizing tests were made on a low-carbon steel, mainly at a carburization temperature of 925° C. Various ways in which the energizers K_2CO_3, Na_2CO_3, and $BaCO_3$ may be placed in the box with crushed charcoal and with the objects to be carburized are investigated, and also the effect on carburization of different methods of sealing the box. Experiments to determine the reactions that take place in a carburizing box. (J28, CN)

203-J. Heat-Treatment of Grey Cast Iron; Report and Recommendations of Sub-Committee T.S. 31. *Institute of British Foundrymen,* Paper 1012, 1951, 8 pages.

(J general, CI)

204-J. Gaseous Nitriding. Allan Morgan. *Australasian Engineer,* June 7, 1951, p. 82-89.

An explanation of the mechanism of nitriding. The composition and condition of supply of the various grades of Nitralloy. Preparing the material for nitriding and the nitriding process itself. Necessary precautions, typical applications and limitations to the use of nitrided Nitralloy. 11 ref. (J28, AY)

205-J. Economic Aspects of Controlled Atmospheres. (In French.) Félix Barbas. *Métallurgie et la Construction Mécanique,* v. 83, May 1951, p. 169, 171, 173, 175, 177.

Investigated for electric muffle furnaces. Physical and physicochemical phenomena of furnaces, deoxidation of confined atmospheres, and advantages of controlled atmospheres in metal heat treating. (J2)

206-J. Nitriding of Various Kinds of Steel. (In French.) Jean Daurat. *Métallurgie et la Construction Mécanique,* v. 83, Apr. 1951, p. 255-258, 266; May 1951, p. 363-371; June 1951, p. 479-481, 483.

Preliminary heat treatment, hardness, and effect of foreign bodies in surface nitriding processes. Properties of nitrided cases for ten common types of steel, as well as properties of nickel, graphite, austenitic steels, and cast iron. Nitriding procedure. (J28, ST)

207-J. Quenching and Aging Phenomena in Aluminum-Magnesium Alloys. (In French.) Marcel Armand. *Revue de l'Aluminium,* v. 28, June 1951, p. 220-226.

Normalized and quenched Al-Mg alloys show aging similar to duralumim and some other alloys at room temperature. At higher temperatures a structural modification occurs due to a precipitated phase oriented

toward certain crystallographic planes. Kinetics of phenomena depend on rate of cooling after normalization. (J27, N7, Al, Mg)

208-J. Effect of Heat Treating on the Strength of Propellers Made of Al-Zn-Mg Alloys. (In German.) Franz Bollenrath, Walter Bungardt, and Hanns Gröber. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 463-469.

Notched and unnotched specimen of above alloys were used for fatigue and creep-stress resistance tests made to determine effect of heat treating and alloy composition. Method of experimentation. (J general, Q3, Q7, Al, Zn, Mg)

209-J. The Heat Treatment of Welds in Pipelines. A. H. Goodger. *Engineering,* v. 172, July 27, 1951, p. 125-127; Aug. 3, 1951, p. 157-158; Aug. 10, 1951, p. 191.

Results of a comprehensive study of the above, including fundamental causes of cracking in pipeline welds. Results of quenching tests on 1% Cr, 0.5% Mo steel pipe are tabulated. Includes macrographs and micrographs. Concluding installment includes tables of recommended practice for heat treatment of oxy-acetylene and metallic-arc pipeline welds in a series of carbon and alloy steels. (J general, CN, AY)

210-J. Heat-Treatment of Grey Cast Iron; Report and Recommendations of Sub-Committee T.S. 31. T. R. Twigger, chairman. *Foundry Trade Journal,* v. 91, Aug. 2, 1951, p. 117-124.

Includes graphs and tables. 12 ref. (J general, CI)

211-J. Bright Annealed Brass Strip Produced in Quantity by Continuous Installation at Buffalo Plant of American Brass Company. *Industrial Heating,* v. 18, Aug. 1951, p. 1370-1374, 1494.

In a 160-ft. processing line, annealing, pickling and cleaning operations are integrated into one continuous process. (J23, L12, Cu)

212-J. The Operation of Small Salt Baths. S. W. Hugo. *Machinery* (London), v. 79, Aug. 2, 1951, p. 198-201.

Practical recommendations clarified by diagrams and illustrations. (J2)

213-J. The Role of Boron Steels in the Present Emergency. P. R. Wray. *Materials & Methods,* v. 34, Aug. 1951, p. 57-60.

See abstract of "Boron Steels in the Present Emergency," *Steel;* item 193-J, 1951. (J26, ST)

214-J. The Surface Hardening of Steel. Part VI. Gas Carburizing. G. T. Colegate. *Metal Treatment and Drop Forging,* v. 18, July 1951, p. 317-332.

Problems associated with sooting and its prevention. Potentialities of commercial gas carburizing atmospheres and the function of diluents. 10 ref. (J28, ST)

215-J. Evaluation of Protective Atmospheres for Tool Steels. Part I. Lester F. Spencer. *Tool Engineer,* v. 27, Aug. 1951, p. 32-35.

General factors, causes of decarburization, furnaces and furnace atmospheres, the surface-protection problem, and factors that vary the rate of heat-up. (To be continued.) (J2, TS)

216-J. The Carbonitriding Process of Case Hardening Steel. G. W. P. Rengstorff, M. B. Bever, and C. F. Floe. *Transactions of American Society for Metals,* v. 43, 1951, p. 342-371; disc., p. 371-377.

Previously abstracted from *American Society for Metals,* Preprint 1, 1950. See item 226-J, 1950. (J28, CN)

217-J. Constitution of Carbonitrided Cases. G. W. P. Rengstorff, M. B. Bever, and C. F. Floe. *Transactions of American Society for Metals,* v. 43, 1951, p. 378-398; disc., p. 398-403.

Previously abstracted from *American Society for Metals,* Preprint 2, 1950. See item 230-J, 1950. (J28, M22, N8, CN)

218-J. A Hardenability Test for Deep Hardening Steels. William Wilson, Jr. *Transactions of American Society for Metals,* v. 43, 1951, p. 454-473; disc., p. 473-479.

Previously abstracted from *American Society for Metals,* Preprint 18, 1950. See item 227-J, 1950. (J26, Q29, AY)

219-J. An Examination of the Quenching Constant, H. D. J. Carney and A. D. Janulionis. *Transactions of American Society for Metals,* v. 43, 1951, p. 480-493; disc., p. 493-496.

Previously abstracted from *American Society for Metals,* Preprint 19, 1950. See item 228-J, 1950. (J26, SS)

220-J. The Tempering of Chromium Steels. R. W. Balluffi, Morris Cohen, and B. L. Averbach. *Transactions of American Society for Metals,* v. 43, 1951, p. 497-517; disc., p. 517-525.

Previously abstracted from *American Society for Metals,* Preprint 20, 1950. See item 229-J, 1950. (J29, N8, AY)

221-J. Induction and Flame Hardening Simplified. John Obrebski. *American Machinist,* v. 95, Sept. 17, 1951, p. 136-137.

Theory that explains some hardening phenomena and why desired results are not always obtained. (J2)

222-J. Investigations Into the Carbonitriding of Plain Carbon Steel. H. C. Fiedler, M. B. Bever, and C. F. Floe. *American Society for Metals,* Preprint 7, 1951, 14 pages.

AISI 1020 steel was carbonitrided

for 4 hrs. at 1625° F. and oil quenched; the inlet gas composition was 10% NH_3, 10% CH_4, and 80% carrier gas. Hardness measurements were made, the case structure was examined metallographically, and the retained-austenite content determined by lineal analysis. The results extended published NH_3 concentrations which are representative of a trend in industrial carbonitriding practice. Controlling austenite in carbonitrided cases by interruption of NH_3 flow, cooling to subatmospheric temperatures, and multiple tempering. A comparison of growth as a function of case depth was made between cases formed by carburizing at 1700° F., and by carbonitriding at 1500° F. (J28, CN)

223-J. An Investigation of the Quenching Characteristics of a Salt Bath. M. J. Sinnott and J. C. Shyne. *American Society for Metals,* Preprint 29, 1951, 12 pages.

The quenching constant H, used to determine the severity of a given quench, was determined for quenching from a high-temperature salt bath at 1550° F. into low-temperature unagitated salt baths between 385 and 725° F. Values of H were found to be comparable to those reported for oil quenching with good to violent agitation. Variations in values of H, depending on where temperature measurements are taken, are shown to be due to the existence of a surface-film resistance. Instantaneous value of this surface-film heat-transfer coefficient is a function of temperature difference between the metal surface and temperature of the quenching bath. Experimental material was Type 430 stainless. (J2, SS)

224-J. Limitations of the End-Quench Hardenability Test. A. R. Troiano and L. J. Klingler. *American Society for Metals,* Preprint 30, 1951, 11 pages.

Three steels of comparable hardenability, SAE 2340, 1340, and 5140 were end-quenched in bars less than the standard 1-in. diameter. The subsize bar of SAE 2340 exhibited substantially greater hardenability than indicated by the standard end-quench test, while no change in hardenability for SAE 5140 was obtained under the same conditions. From a consideration of transformation characteristics, cooling curves, and their relationships to quenched objects, as well as notch properties of slack-quenched specimens, it is concluded that the end-quench hardenability test does not always rate steels accurately with respect to their true hardenability or ability to be hardened in various section sizes. (J26, AY)

225-J. A Correlation of End-Quenched Test Bars and Rounds in Terms of Hardness and Cooling Characteristics. E. W. Weinman, R. F. Thomson, and A. L. Boegehold. *American Society for Metals,* Preprint 31, 1951, 32 pages.

Results obtained when a more precise correlation was sought between a given location in a quenched round and equivalent position on the end-quenched test bar. New correlation charts cover a wider variety of oil and salt-quenching conditions. The difference in cooling between end-quenching test bars and quenched rounds. One carbon and six low-alloy steels were studied. (J26, CN, AY)

226-J. Hydrogenizing Effect of Steam on Ferrous Alloys at Elevated Temperatures. C. A. Zapffe and F. E. Landgraf. *American Society for Testing Materials,* "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 50-57; disc., p. 58.

See abstract of "Embrittling Effect of Steam on Stainless at Elevated Temperatures," *Steel.* (Item 121-J, 1951.) (J26, Q23, SS)

227-J. An Evaluation of the Hardening Power of Quenching Media for Steel. Earl J. Eckel, Ross M. Mayfield, Glen W. Wensch, and Frank A. Rough. *Engineering Experiment Station, University of Illinois,* Bulletin Series 398, June 1951, 131 pages. *(University of Illinois Bulletin,* v. 48, no. 73)

Contains following articles: "Water, 9 Percent Brine, Straight Mineral Oil, Compounded Oil, and Air Under Agitated Quenching Conditions", Earl J. Eckel; "Brines (0 to 25 Percent Sodium Chloride) Under Agitated Quenching Conditions", Earl J. Eckel and Ross M. Mayfield; "High-Temperature Quenching Oil and Ethylene Glycol Under Agitated Quenching Conditions", Earl J. Eckel and Glen W. Wensch; "Water, Brines, and Oils Under Still Quenching Conditions", Earl J. Eckel and Frank A. Rough. 45 ref. (J2, ST)

228-J. Flame Hardening. E. F. Green. *Industry & Welding,* v. 24, Aug. 1951, p. 39-40, 65; Sept. 1951, p. 38, 72-74.

Fuels, temperatures, methods, and procedures. Concluding article covers quenching, stress relieving, and testing of flame hardened parts. Advantages of flame hardening in general. (J2)

229-J. Carbonitriding on the Increase, Survey Shows. M. B. Bever, C. F. Floe, and W. G. Zaruba. *Iron Age,* v. 168, Sept. 13, 1951, p. 151-155.

A survey of carbonitriding practice. A wide variety of parts are be-

ing treated, including stampings, forged parts, machined parts and cast iron. Advantages other than cost savings are having a big influence on the growing use of carbonitriding. A trend toward use of higher temperatures is noted. Continuous and batch-type furnaces were studied. (J28, ST, CI)

230-J. Annealing of Platinum for Thermometry. Robert J. Corruccini. *Journal of Research of the National Bureau of Standards,* v. 47, Aug. 1951, p. 94-103.

Experiments in which the coefficient of resistance and thermal emf. were used as criteria of the physical state of the metal. The electrical properties of dilute alloys of Au, Ag, and Cu in Pt were measured. Contrary to prediction, the Cu and Ag alloys were thermoelectrically positive to Pt at ordinary temperatures. 14 ref. (J23, P16, Pt, SG-a)

231-J. Hydrogen and Heat Treating. Carl A. Zapffe. *Metal Treating,* v. 2, July-Aug. 1951, p. 8, 18, 23.

How the workability of steel is impaired by H_2 picked up during heat treatment, also how the gas can be removed. (J general, ST)

232-J. The Surface Hardening of Steel. Part VII. Nitriding. G. T. Colegate. *Metal Treatment and Drop Forging,* v. 18, Aug. 1951, p. 363-368.

Processes in which nitrogen is solely responsible for the hardening effect or in which carbon and nitrogen play a part. The Fe-N system, steels for nitriding, influence of various alloying elements, and condition and preparation of steels. (To be continued.) (J28)

233-J. Continuous Heat Treatment Improves Pipe Physical Properties. Charles A. Turner, Jr. *Steel,* v. 129, Sept. 17, 1951, p. 97-98, 101, 104, 106-107, 109.

New high-speed method which, with its improved cooling rate utilizing a spray quench, produces full hardening without the use of alloying additions. (J26)

234-J. Low Temperature Steel Processing. Thomas A. Dickinson. *Steel Processing,* v. 37, Aug. 1951, p. 381, 399.

Low temperatures may be used to supplement or replace heat treatment for the annealing or tempering of alloys in order to minimize difficulties due to oxidation. (J23, J29, ST)

235-J. Evaluation of Protective Atmospheres for Tool Steels. Part II. *Tool Engineer,* v. 27, Sept. 1951, p. 47-51.

Methods used in determining the surface effect of toolsteels when heat treated under special atmospheres. A "change in weight" procedure and experimental results. (J2, TS)

236-J. Economies Obtained With Induction Hardening. R. E. Van Dwenter and G. Bidigere. *Machinery* (London), v. 79, Aug. 16, 1951, p. 277-281.

Induction heating for selective surface hardening operations at Packard Motor Car Co. Advantages of this method. (J2, ST)

237-J. The Heat Treatment of 3% Nickel-Chromium Case-Hardening Steel. H. D. Mansion. *Metallurgia,* v. 44, Aug. 1951, p. 57-62.

Results of laboratory investigation into the heat treatment of two samples of En.36 Ni-Cr case hardening steel by various methods. Hardness and metallurgical structure were studied. (J28, Q29, M27, AY)

238-J. Hardening Steel by Liquid Cooling; The Work of H. Le Chatelier. (In French.) Albert Portevin. *Revue de Métallurgie,* v. 48, July 1951, p. 497-504.

Experimental and industrial processes; data and equipment. (J26, ST)

239-J. Recent Developments in Thermal Treatment in Connection With Conditions for Heating and Cooling. (In French.) A. Sourdillon. *Revue de Métallurgie,* v. 48, July 1951, p. 505-521.

Temperature and duration of heating, laws of cooling, continuous cooling, mechanical properties, deformations and stresses and residual stresses are discussed. 67 ref. (J general, Q25, ST)

240-J. Induction Hardening of Castings. (In Italian.) Gianberto Pogatschnig. *Associazione Italiana di Metallurgia.* "Foundry Proceedings." Vol. II, 1948, p. 82-90.

Method for experiments on Ni, Cr-Ni, Cr-Ni-Mo, Cr-Mo, and Cr-Mo-Al steels. Results and micrographs. (J2, AY)

241-J. Annealing of Steels and the Metallurgical Variables. (In Spanish.) Enrique D. Bia. *Instituto de Ensayo de Materiales,* no. 21, 1950, 16 pages.

Experiments were done on open-hearth steel (0.564% C, 0.208% Si, 0.556% Mn, 0.013% P, 0.016% S), investigating structural variations, annealing capacity and hardness. (J23, CN)

242-J. Determination of the Transformation Interval for the Modified End-Quench Method. (In Spanish.) Enrique D. Bia. *Instituto de Ensayo de Materiales,* no. 23, 1950, 12 pages.

The methods used by Pumphrey and Jones were tested on various steels. Results are tabulated and charted. (J26, ST)

243-J. (Book) **The Heat Treatment of Steel.** (In Russian.) I. E. Kontorovich. 452 pages. 1945. State Publishing House

for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

Russian equivalent of American books by Sauveur or Bullens. The coverage is methodical and comprehensive. Several charts are reproduced from American publications. Contains little if any information not found in non-Russian literature. (J general. ST)

244-J. Pulverized Fuel Furnaces for Annealing Malleable Cast Iron. H. W. Perrott. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Aug. 1951, p. 40-51; disc., p. 51-53.

In the ring-main method of distributing fuel only one feeder and fan are used with individual valves at each oven. Illustrates the use of pulverized-fuel firing in conjunction with various types of annealing furnaces, both side-fired and end-fired, and end-fired and topside-fired bogie-type ovens. Also the continuous bogie-type malleable annealing furnace. Includes operating data. (J23, B18, CI)

245-J. The Gaseous Annealing Process. K. Roesch. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Aug. 1951, p. 55-57; disc., p. 57.

Gaseous annealing furnace heated by means of radiant tubes installed at the German works of Bergische Stahl-Industrie. Comparative heat treatment curves for three types of gaseous annealing furnaces and an ore-annealing furnace. Comparative figures for monthly output, power consumption, consumption of boxes and ore, and capital costs are given for gaseous annealing furnaces and a pit furnace for annealing ore. (J23)

246-J. Annealing Blackheart Malleable Cast Iron in a Controlled Atmosphere Furnace. E. Hunter. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Aug. 1951, p. 59-64; disc., p. 64-66.

Radiant-tube bell-type furnaces are fired by producer gas generated in gas producers operating on anthracite fuel. The data refer chiefly to 25-ton furnaces, but some reference is made to 5-ton furnaces. (J23, J2, CI)

247-J. Heating and Cooling in Steel Treatment. F. Lomas. *British Steelmaker,* v. 17, Sept. 1951, p. 475-478.

The structural transformations which take place on heating and cooling and the characteristics obtained in accordance with varying temperature changes and the mass of the piece involved. (J2, ST)

248-J. Control of Annealing Temperatures of Copper Alloys to Meet Close Specifications. Joseph Albin. *Industrial Heating,* v. 18, Sept. 1951, p. 1548-1550, 1552, 1554, 1556, 1558, 1560.

Techniques used by the American Brass Co. (J23, Cu)

249-J. Laminated Springs. *Iron and Steel,* v. 24, Sept. 1951, p. 443-445.

Mechanized production of railway springs is now being carried out at English Steel Corp.'s Grimesthrope works. Two furnaces are provided, one for heating the spring packs prior to forming and quenching, the other for tempering. (J26, J29, T7, ST)

250-J. The Hardening and Tempering of Steel—Conventional and Hot Oil Quenching. *Lubrication,* v. 37, Sept. 1951, p. 97-112.

Current quenching and tempering practice is reviewed. Hot-oil quenching is discussed in detail to clarify its present and potential commercial applications. (J2, ST)

251-J. Spheroidizing. J. Lomas. *Machinery Lloyd* (Overseas Ed.), v. 23, Sept. 1, 1951, p. 73, 75, 77-79.

A treatment which enables high-carbon steels to be obtained in the form of cementite balled-up (or spheroidized) in a matrix ferrite. This structure can be much more readily machined. (J23, CN)

252-J. Heat Treating Equipment Integrated in Single Unit. *Steel,* v. 129, Sept. 24, 1951, p. 110.

Complete, controlled system of heat treating—the Contro-Therm process developed by A. D. Alpine, Inc., Culver City, Calif.—uses a heat treating furnace, a loader, and a quench tank, all in one small unit. (J26)

253-J. Effect of Cooling Rate on the Aging of Structural Steels. C. R. Felmley, C. E. Hartbower, and W. S. Pellini. *Welding Journal,* v. 30, Sept. 1951, p. 451s-458s.

Quench and strain-aging characteristics of structural steels were shown to be dependent on rate of cooling from 1200° F. The steels investigated included rimmed, Si-killed, Al-killed, and V-Ti-killed types. Development of aging effects in near-weld zones as a result of mass quenching was demonstrated by strain-aging tests of near-weld zones for welds representative of various cooling rates. (J27, CN)

254-J. Continuous Production Assured With Batch Furnaces. George Brailsford. *American Machinist,* v. 95, Oct. 1951, p. 137-139.

Advantages of batch furnaces for armament manufacturers under present delivery conditions. Construc-

tion features and operation of hardening and drawing furnaces in production heat treat department of Douglas Mfg. Div. of Kingston Products Co. (J26, J29)

255-J. Heat Treatment—Inside Out. H. E. Linsley. *American Machinist,* v. 95, Oct. 1951, p. 144.

A way of stress-relieving large welded tanks when all welding must be done in the field. (J1, ST)

256-J. How Metallurgical Control Solves Shop Problems. T. A. Frischman. *American Machinist,* v. 95, Oct. 1951, p. 145-160.

Sources of problems in the heat treating shop; their effect on production; solutions for typical heat treating problems; preventive measures. (J general)

257-J. Heat Treatment Salts. A. L. Simmons. *Australasian Engineer,* Aug. 7, 1951, p. 44-56.

Classification and details of operating procedure for heat treatment salts in common use. Factors governing operation of salt baths. Properties of various salts. Treatment of high speed steels. 45 ref. (J2, TS)

258-J. Gaseous Nitriding. Allan Morgan. *Engineers' Digest,* v. 12, Sept. 1951, p. 290-292, 313. (Condensed.)

Previously abstracted from *Australasian Engineer.* See item 204-J, 1951. (J28, AY)

259-J. Rapid Tempering of High Speed Steel. A. E. Powers and J. F. Libsch. *Journal of Metals,* v. 3, Oct. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 865-871.

The early progress of reactions leading to secondary hardness in high speed steel, type 6-5-4-2 was studied to determine if induction tempering treatments of a few seconds duration are able to produce results equal to those of more conventional long-time tempering cycles. Temperature curves and summaries of heat treatments. 20 ref. (J29, TS)

260-J. The Significance of the Iron-Carbon Diagram in Heat Treatment. R. Whitfield. *Machinery* (London), v. 79, Sept. 13, 1951, p. 452-455.

Presents a diagram showing various alloy phases of iron and carbon, and steel up to 1.7% carbon. Treatments of these various phases are discussed. (J general, M24, Fe, ST)

261-J. Austempering. J. Lomal. *Machinery* (London), v. 79, Sept. 20, 1951, p. 503-505.

Limitations and modifications of the method. Applications to treatment of gray-iron castings as well as steel. (J26, ST, Fe)

262-J. Salt Baths for Metal Treating. Philip O'Keefe. *Materials & Methods,* v. 34, Oct. 1951, p. 115-130.

Selection of salts and equipment. Design and operating information on the following processes: Carbonizing and cyaniding, neutral hardening, high speed steel treatment, isothermal heat treatments, process annealing, tempering and coloring, heat treatment of Al, brazing, cleaning and descaling, and heating for forging and foaming. (J2)

263-J. Relief of Stress in Cast Iron. *Metal Progress,* v. 60, Sept. 1951, p. 134. (Condensed from "The Relief by Heat-Treatment of Externally Applied Stresses to Cast Iron," G. N. J. Gilbert.)

Previously abstracted from *British Cast Iron Research Association Journal of Research and Development.* See item 205-J, 1950. (J1, CI)

264-J. Sub-Zero Chilling as a Metallurgical Process. Rolland S. Jamison. *Modern Machine Shop,* v. 24, Oct. 1951, p. 140-144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 166, 168, 170, 172, 174, 176.

Applications in treatment of toolsteel, seasoning gages and tools and treating of metal and materials. Procedures for tempering and stabilization of metals. Examples of specific applications. (J2)

265-J. Hot Oil Quenching Expands Use of Carbon Steels. J. H. Greene. *Steel,* v. 129, Oct. 1, 1951, p. 64-67.

Compares hot quenching and conventional quenching. Advantages and disadvantages. Data on quenching media are tabulated. (J2, CN)

266-J. Application of Protective Gases in the Processing of Sheet Metal. (In German.) Robert v. Linde. *Gas- und Wasserfach,* v. 92, Aug. 15, 1951, p. 197-198.

Investigation of use of protective gases in heat treatment of steel and other metals showed that there are protective gases for all operations and that further great technical and economic advantages may be expected from their continued use. (J2, ST)

267-J. Heat Treatment of Metals. Part I. Carrol B. Mershon. *Industrial Heating,* v. 18, Sept. 1951, p. 1576-1578, 1580, 1582, 1584.

General principles of heat treating, the operations of heat treatment and the equipment used. Various furnace types and methods, including cooling, tempering, annealing, normalizing, spheroidizing, quenching and tempering, patenting, austempering, carburizing, nitriding, flame hardening, induction heating, and hydrogen and nitrogen furnace atmospheres. (To be continued.) (J general, CN)

268-J. Tool Steel Heat Treaters Can Profit from T-T-T Curves. L. H. Seabright. *Iron Age,* v. 168, Oct. 11, 1951, p. 101-105.

Time-temperature-transformation curves reveal much valuable information on how to heat treat tool and die steels. They show how to minimize distortion of water hardening and oil hardening steels; and the most practical way to cool high speed steels to satisfactorily transform austenite. (J26, N8, TS)

269-J. Heat Treating. Roger W. Bolz. *Machine Design,* v. 23, Oct. 1951, p. 98-107. (Based on Chapter 55 of the author's forthcoming book "Production Processes—Their Influence on Design", Penton Publishing Co., Cleveland, 1951.)

The various conditioning processes, softening treatments, and hardening treatments. Design considerations, selection of materials, and specification of tolerances. (J general)

270-J. Continuous Heat Treatment of Aluminum Alloy Strip. Marcel Lamourdedieu. *Metal Progress,* v. 60, Oct. 1951, p. 88-92. (Translated from the French).

Preliminary laboratory tests in France and conditions for commercial heat treating schedule. Test furnace was constructed in U. S.; its design and operation. Plans for erection of the furnace in France. (J27, Al)

271-J. Surface Hardening of Nodular Cast Iron With High-Frequency Currents. Takao Takase. *Metal Progress,* v. 60, Oct. 1951, p. 108.

Briefly outlines some experiments on the process. (J2, CI)

272-J. Gaseous Annealing of Black-Heart Malleable Iron. *Metal Progress,* v. 60, Oct. 1951, p. 226, 228. (Condensed from "Gaseous Annealing of Malleable Castings: The Present Position. Part II. Black-Heart Malleable," P. F. Hancock.)

Previously abstracted from *British Cast Iron Research Association Journal of Research and Development.* See item 156-J, 1951. (J23, CI)

273-J. Distortion of Tool Steels in Heat Treatment. J. Y. Riedel. *Metal Treating,* v. 2, July-Aug. 1951, p. 2-5; Sept.-Oct. 1951, p. 6-8.

Emphasis upon the nature of the toolsteel and the size and shape of the tools. (J26, TS)

274-J. The Surface Hardening of Steel. Part VIII. Nitriding. G. T. Colegate. *Metal Treatment and Drop Forging,* v. 18, Sept. 1951, p. 419-425.

The degree of dissociation and rate of flow of ammonia gas, time, and temperature as important factors in nitriding process. Various methods used to prevent nitriding on certain surfaces of a treated part. (To be continued). (J28, ST)

275-J. The Use of the Salt Bath in Forging. Part II. Cyclic Annealing. *Steel Processing,* v. 37, Sept. 1951, p. 463-467.

General principles and practical procedures for annealing before forging. (J23, F22, ST)

276-J. Non-Ferrous Wire Annealing at Bridgeport Brass Company. W. J. Krailing. *Industrial Heating,* v. 18, Oct. 1951, p. 1760, 1762, 1764, 1932, 1934.

Equipment and procedures. (J23, EG-a, Cu)

277-J. ISTC Division VII Reports on Boron Steels. Harry B. Knowlton, editor. *SAE Journal,* v. 59, Oct. 1951, p. 41-47.

Further information on carburizing and heat treating grades of boron steels. Evidence indicates that the heat treating grades (0.30-0.65% carbon) can readily be substituted for higher alloy steels in bolts, springs, axles, and similar parts. Hardenability data as follows are presented: on 14B18—F. F. Vaughn; on SAE 9420 and 94B20—W. E. Jominy; on 4118, 41B18, 50B20, and 8617—Frank Sailer; on 80B20—R. H. Lundquist; on 80B20—S. L. Widrig; on Boron Steels—J. E. Tschopp; on 50B40, 50B50, and 42B60—M. C. Kester, Frank Sailer and C. Parish; on 81B45—B. L. Johnson, Jr. and W. E. Day, Jr.; on 81B40 and 81B45—P. K. Zimmerman; and NE94T22—N. E. Henderickson. (J26, J28, ST)

278-J. Practical Heat Treatment Stress Relieves Stampings. Vincent De Pierre and Harold Bernstein. *Steel,* v. 129, Oct. 22, 1951, p. 88, 90, 93, 96.

Discovery of cracks in a number of one-piece steel stampings, from a lot which had been in storage for some time, initiated an investigation into the cause of failure. The stampings, in the form of right cones, 18 in. high with a 16-in.-diameter base, were made from low-carbon sheet steel, 7/32 in. thick. (J1, S21, CN)

279-J. Patenting With Continuous Cleaning and Coating. C. H. Williams Jr. *Wire and Wire Products,* v. 26, Oct. 1951, p. 881-883.

Procedures and equipment of Pittsburgh Steel Co., Monessen, Pa. The process is applied to high-carbon steel wire. (J25, F28, CN)

280-J. Hardenability of Steel and Its Determination. (In Czech.) Ladislav Jenicek, Jaroslav Koutecky, and Frantisek Labonek. *Hutnické Listy,* v. 6, Jan. 1951, p. 5-14; Feb. 1951, p. 70-75; Mar. 1951, p. 119-128; May 1951, p. 220-228; June 1951, p. 270-286.

The problem of cooling a quenched body is formulated. Using this formulation as a basis, dimensionless factors influencing the temperature distribution within a quenched body are suggested. G. Sachs' crystallization theory was used to show that after making certain assumptions, diagrams of isothermal breakdown of austenite can serve as criteria for hardenability. Results of experimental quenching of Jominy test bars, test wedges, hollow cones, and cylinders of four different steel compositions. Diagrams and nomograms for various shapes: 56 ref. (J26, ST)

281-J. Annealing Furnaces for Malleable Iron. O. E. Cullen and R. J. Light. *Canadian Metals,* v. 14, Oct. 1951, p. 22-24, 26-28.

See abstract of "Malleable Cast Irons—Annealing Furnaces and Atmosphere," *American Foundrymen's Society.* Preprint; item 137-J, 1951. (J23, CI)

282-J. Heat Treatment of Metals: What It Is and How It May Be Accomplished. Carroll B. Mershon. *Industrial Gas,* v. 30, Oct. 1951, p. 11, 21-26.

General principles of heat treating, operations of heat treatment, and basic equipment used. Specific information on heat treatment of steels. (J general, ST)

283-J. Parts Flattened by Annealing Under Weights. Herbert Chase. *Iron Age,* v. 168, Nov. 1, 1951, p. 134-136.

Annealing under weights has replaced hand straightening on parts made from sheet or strip, cutting costs and aiding production. Fixture design and use are simple but important. Better results are obtained from subsequent operations such as case hardening. Parts are mostly mild steel, though some are alloy steel. (J23, CN, AY)

284-J. Gears Spun in Molten Salt Harden Teeth Only. William F. Sorenson. *Iron Age,* v. 168, Nov. 8, 1951, p. 136-137.

Teeth of gears drop forged from SAE 4140 are being hardened to Rockwell C-52 while gear core hardness is kept at C-36 in a new method developed at Yale & Towne Mfg. Co. Gears revolve in a molten salt bath, are quenched in oil, then tempered. Gears show uniform hardness throughout the area treated. Scaling was eliminated. (J2, AY)

285-J. Application of Induction Heating to Production Heat-Treatment Processes at the Standard Motor Company, Ltd., Banner Lane Works, Coventry. L. H. Williams. *Metal Treatment and Drop Forging,* v. 18, Oct. 1951, p. 460-464.

(J2)

286-J. The Oldsmobile Forge Plant. Part II. Heat Treating and Finishing. John C. McComb. *Steel Processing,* v. 37, Oct. 1951, p. 511-516.

The heat treating cycle. First part: Crankshaft quench and draw, rear axle shaft hardening, connecting-rod heat treatment, cycle annealing and normalizing. Second part: Pickling and shot blasting. Third part: Inspection and maintenance.

(J general, L10, L12, S general, ST)

287-J. Gaseous Carburization. (In French.) *Métallurgie et la Construction mécanique,* v. 83, Sept. 1951, p. 657, 659, 661, 663.

Fundamental principles and improvements possible in a special case. Points emphasized are choice of atmosphere, measuring the cemented layer and maximum carbon content of the surface. Refers only to carburization of steel. (J28, ST)

288-J. Surface Hardening. (In German.) O. Fischer. *Metalloberfläche,* sec. A, v. 5, Aug. 1951, p. A120-A125; Sept. 1951, p. A133-A139.

The two principal methods for surface hardening of carbon, alloy, and stainless steels—namely, hardening by altering the chemical composition of the material and by changing its structure. Photographs, diagrams, graphs, and tables. 16 ref.

(J26, J28, ST)

289-J. Effect of Heating Conditions and Size of Pieces on Hardening Time and Depth in the Rotary Flame Hardening Process. (In German.) A. Matting and H. W. Gronegreb. *Schweissen und Schneiden,* v. 3, Aug. 1951, p. 238-242.

Tables and graphs show experimental results. The use of double burners is more economical, the greater the cross section of the steel and the less its required hardness depth. (J2, ST)

290-J. Annealing and Tempering Steel Bars in an Induction Plant Operated at City Power-System Frequencies. (In German.) Helmut Krainer, Max Kroneis, and Franz Raidl. *Stahl und Eisen,* v. 71, Aug. 16, 1951, p. 880-886; disc., p. 886-888.

Investigation of induction annealing and reheating of bars 20-60 mm. in diam. of eight carbon and low-alloy steels. Resulting mechanical properties are charted and tabulated. (J2, Q general, CN, AY)

291-J. Steels for Flame, Induction, and Immersion Surface Hardening. (In German.) Hermann Voss. *Stahl und Eisen,* v. 71, Sept. 27, 1951, p. 1037-1040.

Procedures and problems of hardening steels by these methods. A higher carbon content produces higher surface hardness, while steels with a higher alloy content become hardened to greater depths under the

same conditions. Graphs and tables include data from the U. S. and England. 13 ref. (J2, ST)

292-J. Strength and Wear of Induction and Case-hardened Gears. (In German.) Heinz Glaubitz. *Stahl und Eisen,* v. 71, Sept. 27, 1951, p. 1040-1044.

Comparative experiments were made on hardness of gear teeth, distortion during hardening, transverse strength and bending fatigue limit, impact strength, and wear resistance of several carbon and low-alloy gears treated by the two processes.

(J2, J28, Q general, CN, AY)

293-J. Hardening and Tempering Steel With the Aid of Fuel Gas—Oxygen Flames Without Furnaces. (In German.) Hans Bühler. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, Aug. 21, 1951, p. 756-758.

Experiments on the flame hardening of steel. Physical properties of flame hardened and furnace hardened steels are compared and diagrams illustrate the importance of correct preheating. 15 ref. (J2, ST)

294-J. Stress-Relief Annealing of Iron Castings. (In Italian.) Giorgio Cola. *Tecnica Italiana,* v. 6, July-Aug. 1951, p. 324-334.

Reviews the literature. Data are extensively tabulated and charted. 29 ref. (J1, CI)

295-J. The Surface Hardening of Steel. Part IX. Nitriding and Cyaniding Processes. G. T. Colegate. *Metal Treatment and Drop Forging,* v. 18, Oct. 1951, p. 469-475.

Advantages and disadvantages of nitriding compared with other case-hardening processes. The characteristics of nitrided cases and the application of nitrided steels. Principles and practices of cyaniding and similar processes. (To be continued.) (J28, ST)

296-J. Sub-Zero Chilling Has Become a Valuable Metallurgical Process. Rolland S. Jamison. *Refrigerating Engineering,* v. 59, Nov. 1951, p. 1082-1085, 1134, 1136.

Previously abstracted from "Sub-Zero Chilling as a Metallurgical Process", *Modern Machine Shop.* See item 264-J, 1951. (J2)

SECTION K

JOINING

1-K. Welding Without Heat or Electricity. *Automotive Industries,* v. 103, Dec. 15, 1950, p. 48, 100.

Some new applications of the "Koldweld" process: "trap weld" for attachment of screw studs to metal panels; wave weld for joining flat stock; stagger weld for joining thin sheet to heavy bar stock; sandwich weld (one piece sandwiched between two others and joined to both); and other applications. (K5)

2-K. New Weldment Shop Adds Versatility. John C. McComb. *Steel Processing,* v. 36, Dec. 1950, p. 612-615, 630-631.

Equipment and procedures for all types of welding at Continental Foundry & Machine Co.'s East Chicago plant. Includes 2 shops—one for heavy steel and one for steel ½ in. thick or less.
(K general, A5, CN)

3-K. Welded Pump Rotor Saves Machining. B. J. Rosen. *Iron Age,* v. 166, Dec. 21, 1950, p. 78-79.

As a one-piece part, a carbon-steel pump rotor required too much complicated machining. When made in halves, machining is simpler and less steps are required. Despite cost of assembly, the new method reduces over-all production costs. Special electrode is used. (K1, A5, CN)

4-K. Flash-Welded Tool Joints Show Consistent Strength. William S. Bachman. *Drilling,* v. 12, Dec. 1, 1950, p. 20.

Tests show that fatigue failures hit in the upset area near the weld line but never in the connection itself. (K3, Q7, AY)

5-K. Exacting Control Employed in Flashwelding Tool Joints. *Drilling,* v. 12, Dec. 1, 1950, p. 50.
(K3, AY)

6-K. Automatic Welding Keeps Transformers Flowing. *Steel,* v. 127, Dec. 25, 1950, p. 61.

Production-line fabrication of transformers by flash, seam, projection, and spot welding.
(K3, T1, CN)

7-K. A Britisher Comments on American Welding. William L. Warner. *Metal Progress,* v. 58, Dec. 1950, p. 894, 896, 898, 900. Condensed from "The Resistance Welding of Mild Steel Sheet", W. S. Simmie.

Previously abstracted from *Welding Journal.* See item 498-K, 1950. (K3, T21, CN)

8-K. Multiple Layer Submerged-Arc Welding of Pressure Vessels. L. C. Stiles and D. H. Curry. *Welding Journal,* v. 29, Dec. 1950, p. 1065-1068.

How difficulties of flux removal were overcome and optimum bead shape and size developed. (K1, ST)

9-K. Crack Sensitivity of Aircraft Steels. *Welding Journal,* v. 29, Dec. 1950, p. 1068-1069.

Jay Bland discusses above paper by A. W. Steinberger, B. J. DeSimone, and J. Stoop. (Sept. 1950 issue; see item 565-K, 1950.) Includes authors' reply. (K9, T5, T24, AY, SS)

10-K. Procedure Approval Tests. Samuel S. Katsef. *Welding Journal,* v. 29, Dec. 1950, p. 1070-1077.

How tests were developed for weldments used in naval equipment. Includes representative data forms and a flow sheet for the performance of tests and recording of results. (K9)

11-K. Latest Developments in Koldwelding. William Dubilier. *Welding Journal,* v. 29, Dec. 1950, p. 1077-1081.

New developments in "Koldweld" pressure welding includes trap welding, wave welding, stagger welding, sandwich welding, lap welding, Koldweld electrical contacts, wires and conductors, and other applications. (K5)

12-K. Flash Welding Nonferrous Materials. *Welding Journal,* v. 29, Dec. 1950, p. 1087-1088.

Charles Bruno, Jerry Martin, and C. R. Dixon discuss separately above paper by F. L. Brandt (Sept. 1950 issue; item 559-K, 1950). (K3, EG-a)

13-K. Copper Alloy Brazing for Production Economy. C. E. Swift and E. B. Brown. *Welding Journal,* v. 29, Dec. 1950, p. 1089-1093.

New braze-welding practices and a new fluxing procedure which cut down the time required for joining and finishing assemblies of thin steel. (K8, ST)

14-K. Stud Welding Speeds Steel Production. Robert C. Singleton. *Welding Journal,* v. 29, Dec. 1950, p. 1094-1096.

How stud welding has proved extremely useful as a maintenance tool for such steel-mill applications as open-hearth doors, wet skid tubes, openhearth burners, and crane rails. (K1, T5, ST)

15-K. Automatic Welding for the Transcontinental Hudson River Crossing. *Welding Journal,* v. 29, Dec. 1950, p. 1100-1101.

Equipment and procedures for arc welding 26-in. diameter pipe line. (K1, CN)

16-K. Tapers for Resistance Welding Electrodes and Holders. W. E. Smith. *Welding Journal,* v. 29, Dec. 1950, p. 1104-1105.

A new, improved standard taper for resistance welding electrodes which has a number of advantages. (K3)

17-K. Physical Metallurgy of Austenitic Stainless Steels. Helmut Thielsch. *Welding Journal,* v. 29, Dec. 1950, p. 577s-621s.

The present state of knowledge and results of recent research investigations on Cr-Ni stainless steels and their weldability. Phase relations, corrosion resistance, crack sensitivity, stress-corrosion cracking, and effects of cold deformation and of subzero and elevated temperatures. 257 ref.
(K9, M24, R general, SS)

18-K. The Welding of Light Metals in an Inert Atmosphere. (In French.) Charles Guinard. *Revue de l'Aluminium,* v. 27, Sept. 1950, p. 337-345.

Equipment and procedures. Mechanical properties of welds in various Al alloys made by this method. (K1, Al)

19-K. Comparison of Different Methods for Welding Cast Iron. (In French.) H. Gerbeaux. *Soudure et Techniques Connexes,* v. 4, Sept.-Oct. 1950, p. 188-195.

Critically reviews the various methods, especially the applicability of an individual welding method to a certain type of cast iron, such as, gray cast iron, malleable cast iron, cast iron with nodular graphite, etc. (K general, CI)

20-K. Experimental Research on Spot Welded Frames. (In French.) Artémy S. Joukoff. *Revue de la Soudure; Lastijdschrift,* v. 6, No. 3, 1950, p. 136-143.

A short resumé of results of the research. Methods of investigation, including compression and fatigue tests. On the basis of tabulated and charted data, spot welded frames appear to be acceptable from the point of view of their rigidity in compression tests. However, fatigue testing indicates that such frames are below required standards. A series of fractures was observed, not in the spot welds, but adjacent to them.
(K9, K3, Q28, Q7, CN)

21-K. The Influence of Certain Operational Factors on the Effectiveness of the Oxy-Acetylene Flame. (In Russian.) N. N. Rykalin and M. Kh. Shorshorov. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 9-11.

The order of decreasing influence for the factors studied was found to be: angle of inclination of flame to surface of metal, thickness of metal, rate of flow of gas mixture or diameter of nozzle, ratio of oxygen to acetylene, distance of nozzle from metal surface, and rate of travel of the flame. Results are applicable to both welding and cutting. (K2, G22)

22-K. Deformation of Tungsten Electrodes During Argon-Arc Welding. (In Russian.) A. Ya. Brodskii and A. V. Petrov. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 11-15.

Causes and effects of reversible and irreversible deformation (elongation and necking, respectively) of the tip of the tungsten electrode in argon-arc welding. (K1)

23-K. Resistance of Sheet Metal During Spot Welding. (In Russian.) L. I. Gastila. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 17-18.

Brief theoretical treatment. Derives a formula for determination of resistance, depending on fundamental factors. (K3)

24-K. Apparatus for Determination of Eccentricity and Thickness of Electrode Coatings for Arc Welding. (In Russian.) M. A. Penkin. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 18-20.

Apparatus is characterized by simplicity and accuracy of measurement up to 0.03 mm. The device is

based on the principle of the inductive collector and is designed as an unbalanced a.c. bridge. Electrical circuit is illustrated schematically. (K1)

25-K. Automatic Welding of Large-Diameter Pressure Piping Under Field Conditions. G. A. Polonskii. (In Russian.) *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 20-22.

Methods, apparatus and operating data. (K1, CN)

26-K. One Case of Crack Formation in Welds During Construction of Tanks. (In Russian.) V. I. Shabalin. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 27-28.

Crack formation under subzero weather conditions was investigated. Methods of minimizing this tendency. (K1, CN)

27-K. Electrode Holder With Ejector for Spot-Welding Machines. (In Russian.) V. A. Yakimov. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 28-29.

Describes and diagrams the apparatus. (K3)

28-K. Metallography of a Blackheart Malleable Cast-Iron Weld. (In Czech.) Stanislav Blazek. *Hutnické Listy,* v. 5, Sept. 1950, p. 374-375.

Microstructure of the weld. Concludes that cracks developing during welding are caused by carbon diffusion from the iron into the weld and rapid heat removal during cooling, the weld becoming martensitic. (K9, M27, CI)

29-K. Gray Iron: Welding; Joining; Cutting. Part III. C. O. Burgess. *American Foundryman,* v. 18, Dec. 1950, p. 48-53. (From Chapter VII, "Gray Iron Handbook," to be issued by Gray Iron Founders' Society.)

Thermit welding, soldering, flash welding, joining to other metals by casting the two metals together, and torch and arc cutting. 55 ref. (K general, G22, CI)

30-K. Auto Body Repair. *Linde Tips and Oxy-Acetylene Tips,* v. 30, Jan. 1951, p. 10-11.

Welding repair procedures. (K2, T21, CN)

31-K. Braze-Welding Furnace and Boiler Sections. *Linde Tips and Oxy-Acetylene Tips,* v. 30, Jan. 1951, p. 16-17.

Procedures. Material is cast iron. (K8, CI)

32-K. Welding Goes Up. L. G. Stevens. *Welding Engineer,* v. 36, Jan. 1951, p. 17-19.

Use of welding in construction of 250-ft. library tower at Oklahoma City University. (K general, T26, CN)

33-K. Hot Tie-in on Pipe Line. Clinton Wing and Fred Stettner. *Welding Engineer,* v. 36, Jan. 1951, p. 20-21.

Repair of pipelines while they contain natural gas. Work is done under slight positive pressure of gas, which on escaping envelopes the region with flames. The welders cut and reweld in this zone while wearing asbestos suits. The pressure and resulting flame must be maintained to prevent explosions. (K2, CN)

34-K. Atom-Smasher Chamber. Jack Medoff. *Welding Engineer,* v. 36, Jan. 1951, p. 22-23.

Technique developed for arc welding 2½-in. Al plates used for the frame of the vacuum chamber of a 60-in. cyclotron. (K1, Al)

35-K. Building an Ice Floor. Richard G. Swisher. *Welding Engineer,* v. 36, Jan. 1951, p. 24-25, 28.

How the floor of an ice-skating arena was constructed by use of arc welding. (K1, T26, CN)

36-K. Flash Welding Steel Strip. *Welding Engineer,* v. 36, Jan. 1951, p. 32-33.

New 600-kva. equipment, which includes a system for automatic gaging according to thickness. (K3, CN)

37-K. Series-Arc Welding. A. R. Lytle and E. L. Frost. *Welding Engineer,* v. 36, Jan. 1951, p. 38-42.

A new method of submerged-arc welding which hooks up the electrodes in series so the work isn't a part of the welding circuit. This technique is said to offer great possibilities for surfacing or cladding where low dilution is essential. Application to cladding with stainless steel, to deposition of Cu alloys and of Ni and Monel, and to hard-facing. (K1, L24, SS, Cu, Ni)

38-K. Latest Developments in Koldwelding. William Dubilier. *Western Machinery and Steel World,* v. 41, Dec. 1950, p. 56-59. (K5)

39-K. How To Weld Magnesium. Part Three. Inert-Gas-Shielded Metal Arc Welding. Paul Klain. *Industry & Welding,* v. 23, Nov. 1950, p. 30-31, 34, 46-47. (K1, Mg)

40-K. Designed for Welding. S. M. Taylor. *Industry & Welding,* v. 24, Jan. 1951, p. 22-24, 44-45.

Applications of welding and flame cutting in production of heavy-duty, off-highway hauling equipment by Euclid Road Machinery Co. (K general, G22, T4, CN)

41-K. How to Spot Weld Magnesium. Paul Klain. *Industry & Welding,* v. 24, Jan. 1951, p. 26-27, 70.

Clarified by diagrams. (K3, Mg)

42-K. Are *You* Brazing Aluminum? George Terbeek. *Industry & Welding,* v. 24, Jan. 1951, p. 36-39.

Report on a well-equipped shop points up importance of the process and its possibilities for other users. (K8, Al)

43-K. Better Welding at Lower Cost. Lew Gilbert. *Industry & Welding,* v. 24, Jan. 1951, p. 40, 42-43, 67.

Choice of materials; welding method; joint design. (K general, A4)

44-K. Braze-Welding to Repair Large Castings. *Industry & Welding,* v. 24, Jan. 1951, p. 48.

Three applications. (K8, CI)

45-K. The Welded Pressure Vessel Code. *Industrial Chemist and Chemical Manufacturer,* v. 26, Nov. 1950, p. 478-479.

Excerpts from discussion of the Provisional British Standard Code 1500, 1949, for fusion-welded pressure vessels for use in chemical and allied industries. (K general, T26, S22, ST)

46-K. Reports of International Welding Commissions. *Transactions of the Institute of Welding,* v. 13, Oct. 1950, p. 135-141.

Reports of the following Commissions, given verbally at Paris meeting, June 5-10, 1950: Resistance Welding; Documentation; Terminology; Standardization; Weldability; Residual Stress and Stress Relieving; and Brittle Fractures. (K general)

47-K. The Weldability of Chromium-Molybdenum Steels. Steel Composition and Arc Welding Procedure. H. F. Tremlett. *Transactions of the Institute of Welding,* v. 13, Oct. 1950, p. 143-156.

The problem of welding Cr-Mo steels in plate form without cracking and with suffiicent ductility in the joint to preclude the possibility of cracks developing during loading. To provide for the first of these requirements, the Reeve fillet-weld test was used and welding factors adjusted until freedom from cracking was obtained. The second requirement was fulfilled by selecting a hardness of 350 D.P.H. as the maximum to be permitted in the fabricated structure. Three types of Cr-Mo steel were examined and welding procedures determined. (K9, K1, AY)

48-K. Aspects of Welding Distortion in Shipbuilding. D. M. Kerr. *Transactions of the Institute of Welding,* v. 13, Oct. 1950, p. 157-162; *Welding,* v. 18, Dec. 1950, p. 529-538.

Methods for preventing or minimizing distortion, based on experimental work. (K general, T22, CN)

49-K. A Review of Recently Published Information on the Spot Welding of Light Alloys. (With Particular Reference to Stored Energy Methods.) P. M. Teanby. *Welding Research,* v. 4, Oct. 1950 (Bound with *Transactions of the Institute of Welding,* v. 13), p. 94r-101r.

31 references. (K3, Al, Mg)

50-K. The Finnart Pipeline. *Welding,* v. 18, Dec. 1950, p. 508-511.

Welding equipment and procedures used in construction of above in Britain. (K general, T4, CN)

51-K. Formulae for Obtaining Settings for the Spot Welding of Clean Mild Steel. R. W. Humpage, B. C. R. Burford. *Welding,* v. 18, Dec. 1950, p. 515-522.

Formulas are derived for calculating welding settings which will produce the best results in low-carbon mild steel sheet of thicknesses up to 0.250 in. The variables concerned and recommendations of different authorities. 11 ref. (K3, CN)

52-K. Welded Steel Trailers; Fabrication With Production Line Technique. *Welding,* v. 18, Dec. 1950, p. 539-541, 547.

Equipment and procedures of British firm. (K1, T21, CN)

53-K. Welding of Copper and Aluminum Conductor Wires. (In German.) Hans v. Hofe, Wilhelm Hofmann, and Hans Sottorf. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 2, 1950, p. 165-174.

Al and Cu were successfully upset-welded within a cylindrical form between the melting points of Al and that of the eutectic, Al-Al_2Cu, i.e. 548° C. The liquid eutectic is formed by contact of the two specimens only. The Al rod ends in the form of a flat hollow cone; and the Cu rod, as a pointed cone, is fitted into it. A ring-shaped slot inside the press cylinder surrounds the contact lines. Under a hammer-blow the oxide film is torn; and Al and the newly formed eutectic fill the notch. Tensile strength of the joint exceeds that of the Al rod. (K3, Cu, Al)

54-K. Autogenous Pressure Welding. (In German.) O. Renner and L. Wolff. *Schweissen und Schneiden,* v. 2, Nov. 1950, p. 283-293.

This is essentially a recrystallization process that occurs below

the solidus line. Principles of the process and its uses in welding of rails and pipe lines. Comparison of mechanical properties and a cost analysis show superiority over other methods of welding. 17 ref. (K2, CN)

55-K. Improving the Welding of a Gas-Tight Container. (In German.) H. Schropp. *Schweissen und Schneiden,* v. 2, Nov. 1950, p. 293-298.

Investigation of a welded tank which was not gas-tight. Procedures adopted to remedy the difficulty, including redesign of the joints, use of different welding-rod compositions, and improved welding techniques. (K2, T26, CN)

56-K. Investigation of High-Efficiency Welding Arcs in a Protective Gas Atmosphere. (In Russian.) G. M. Tikhodeev. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Oct. 1950, p. 1507-1512.

Investigation used direct current between a carbon electrode and low-carbon steel, in hydrogen, argon, a mixture of hydrogen and argon, and in air. Effects of varying current from 200 to 1000 amp. and arc length from 2 to 12 mm. Method of investigation and results. (K1, CN)

57-K. Researches on Welding of Quenched Alloy Steel in Japan. (In English.) Minoru Okada. *Japan Science Review,* ser. 1, v. 1, Mar. 1949, p. 115-120.

Summarizes researches conducted by various Japanese organizations between 1937 and 1945. Arc welding was generally used. (K1, AY)

58-K. Welded and Brazed Brake Bands Use 60 Pct Less Steel. W. H. Haviland and S. M. Spice. *Iron Age,* v. 167, Jan. 11, 1951, p. 68-70.

Change in procedures used to make brake bands for the Buick Dynaflow transmission. They used to be machined from thick stock to leave lugs at each end. Now lugs are separate, attached by projection welding, then brazing. Steel required was formerly 5½ lb. per brake: now it's 2½ lb. (K3, K8, T7, CN)

59-K. Welding Light Metals with Inert Gas Shielded Arc. W. Wade Moss. *Light Metal Age,* Dec. 1950, p. 12-14, 16, 27.

As applied to Al, Mg, and Ti. (K1, Al, Mg, Ti)

60-K. Design for Welded Connections. I. T. B. Jefferson and W. J. Brooking. *Welding Engineer,* v. 36, Jan. 1951, p. 29-31. (From Chapter 6 of "Introduction to Mechanical Design" (Ronald Press, New York.))

Quality and fit-up; weld symbols; internal stresses; distortion of structures; stresses and structures; and how to design a box beam. (To be continued.) (K general, Q25)

61-K. Steel Trunnion Wheels Soft-Surfaced at 60% Saving. J. F. Gulley. *Steel,* v. 128, Jan. 22, 1951, p. 76-77.

How actual welding time for one cast-steel wheel is reduced from 10 days to 9 hr., by use of a mechanized high-density process using a manual hidden-arc welding unit. Mild-steel bars are welded to the wheels. (K1, CI, CN)

62-K. A Revolution in Rubber Bonding to Metals. *Rubber Developments,* v. 3, Dec. 1950, p. 126-128.

New "Redux" process. Mean loads required for failure for different cases. (K11)

63-K. Welding of Light Alloys Using Atomic Hydrogen. (In French.) Charles Guinard. *Revue de l'Aluminium,* v. 27, Nov. 1950, p. 429-435.

Equipment. Advantages. Macrographs show internal structures of the welds in Al alloys. (K1, Al)

64-K. (Book) **Riveting Alcoa Aluminum.** Aluminum Co. of America, Gulf Bldg., Pittsburgh, Pa. 1950, 65 pages.

Riveting in general, common types of heads, strength and protection of joints, driving methods, selection of rivet alloy, and aircraft riveting. (K13, Al)

65-K. (Book) **Schweisstechnik; Ein Handbook. (Welding Technique. A Handbook.)** E. Sudasch. 543 pages. Carl Hanser Verlag, Munich 27, Germany.

The usual methods of welding, including the electric arc, oxyacetylene, and electric resistance processes, together with various special techniques. Considerable space is devoted to design of parts for welding, testing of welds, calculation of welding times, and welding costs. A section is included on the welding of plastics. 533 ref. (K general)

66-K. Make Repair Welds on Large Gray Iron Castings. John H. Walsh. *American Foundryman,* v. 19, Jan. 1951, p. 52-55.

Attempts to repair faulty large-size castings, such as diesel engines and hydraulic equipment, at the plant of Dominion Engineering Works Ltd., Lachine, Quebec. A series of tests was run to determine what could be expected of cast iron welds and the most suitable equipment for the job. (K1, K2, CI)

67-K. Prepared Pastes for Brazing Material. L. G. Klinker. *Metal Progress,* v. 59, Jan. 1951, p. 70-73.

Disadvantages of current methods for application of brazing material in furnace brazing of steel assemblies. Recommends use of metallic pastes and gives figures to show that they are not too expensive. Use of "Cubond" types 151, 153, and 155. (K8, ST)

68-K. Soft Soldering in Production. Charles H. Yetman. *Metal Progress,* v. 59, Jan. 1951, p. 74-75.

How costs were reduced and operations speeded up in production of cigarette lighters from brass. (K7, Cu)

69-K. Bellows Production at Solar Aircraft Company. Eugene H. Ziebold. *Western Machinery and Steel World,* v. 42, Jan. 1951, p. 72-74.

Semi-automatic arc welding of stainless steel and superalloy bellows for jet engines, also bellows of ordinary steel for industrial expansion joints. (K1, ST)

70-K. Aircomatic Welding of Copper-Base Alloys. Harold Robinson and John H. Berryman. *Welding Journal,* v. 30, Jan. 1951, p. 7-25.

General investigation of the weldability of several Cu-base alloys using the gas-shielded metal-arc process. Mechanical properties of a few simple welded joints with a number of electrode-filler materials. Several practical applications. (K1, Cu)

71-K. General Procedures for Fabrication of Pressure Vessels. S. V. Williams. *Welding Journal,* v. 30, Jan. 1951, p. 26-32.

A tentative procedure for fabrication by welding. Special attention is devoted to drawings, specifications, material, layout, forming, fittings, assemblies, welding, inspection, stress relieving, and final testing. (K1, J1, S22, T26)

72-K. Welding Stainless Steel Containers to Meet Sanitary Standards. P. H. Mounts. *Welding Journal,* v. 30, Jan. 1951, p. 33-39.

History of dairy machinery and containers. Equipment and procedures of Cherry-Burrell Corp., Cedar Rapids, Iowa for oxy-acetylene, resistance and arc welding. Special attention must be paid to production of welds free of pits and irregularities which would make the equipment difficult to clean properly. (K1, K2, K3, T29, SS)

73-K. Sun Supertankers. A. A. Holzbaur and F. L. Pavlik. *Welding Journal,* v. 30, Jan. 1951, p. 40-48.

Tankers of 26,000-27,000 tons dead weight. Details of structural arc welding procedures. (K1, T22, CN)

74-K. Welding Aluminum With Inert Arc D. C. *Welding Journal,* v. 30, Jan. 1951, p. 49-52.

Glenn J. Gibson discusses above paper by John W. Mortimer (Oct. 1950 issue, see item 642-K, 1950.) Points out other desirable advantages and applications. (K1, Al)

75-K. Crack Sensitivity in Aircraft Steels. *Welding Journal,* v. 30, Jan. 1951, p. 52-53.

C. E. Sims discusses above paper by A. W. Steinberger, B. J. DeSimone, and J. Stoop (Sept. 1950 issue; see item 565-K, 1950). Includes authors' reply. (K9, T5, T24, AY, SS)

76-K. Backhand Welding of Pipe. J. W. Carrier. *Welding Journal,* v. 30, Jan. 1951, p. 54-55.

Recommended procedures, using the oxy-acetylene torch. Advantages. (K2, CN)

77-K. Economies Accomplished by Redesign for Welding. K. H. Jackson. *Welding Journal,* v. 30, Jan. 1951, p. 56-58.

Several jobs are selected to illustrate conservation of materials and reduction of manufacturing costs and how they can be brought about by welded design. (K general)

78-K. Prolonging Tungsten Electrode Life. *Welding Journal,* v. 30, Jan. 1951, p. 59-60.

Longer electrode life, better welds, labor saving, lower welding costs will result from following simple instructions given by Fansteel Metallurgical Corp., North Chicago, Ill. (K1, T5)

79-K. Welding Procedures for High-Pressure, High-Temperature Steam Piping. N. L. Navarre. *Welding Journal,* v. 30, Jan. 1951, p. 1s-9s.

Development of welding procedures for alloy and stainless steels intended for this service, including preheat and postheat treatments for various alloy combinations, electrode selection, and thermal-shock fatigue tests. (K1, J1, AY, SS, SG-h)

80-K. Rotating Electrode in Manual Metal Arc Welding. Gilbert S. Schaller. *Welding Journal,* v. 30, Jan. 1951, p. 10s-14s.

Holder developed to facilitate striking the arc. The electrode is rotated, thereby providing greater facility not only for striking but for maintaining the arc in metal-arc welding. Photographs illustrate results obtained by the two methods, by novice welders. (K1)

81-K. Welding High-Temperature Austenitic Steel Piping. R. W. Emerson and Matthew Morrow. *Welding Journal,* v. 30, Jan. 1951, p. 15s-33s, disc., p. 33s-39s.

Results obtained on three welds made in Type 347 material, 8⅝-in.

o. d. by 1-in. wall, forged-and-bored. One was welded manually, and two by the submerged-arc process. Welding procedure, mechanical properties of test welds, effects of stabilizing heat treatments and of quench annealing on mechanical properties, determination of ferrite content of weld deposits, time-temperature relation in the conversion of ferrite to sigma, and microfissures in submerged-arc 19-9CB weld deposits. 38 ref. (K1, J23, N8, SS, SG-h)

82-K. Aluminum-Magnesium Filler Metals for Welding High-Strength Aluminum Alloys. D. C. Martin and R. D. Williams. *Welding Journal,* v. 30, Jan. 1951, p. 55s-58s.

It was found that welds made with 8-10% Al-Mg alloy rods have double the yield strength of welds made with 43S filler metal using argon-shielded tungsten-arc welding to join 61S, 24S and 75S Al-alloy plates. The alloys investigated contained 5-15% Mg. (K1, Al)

83-K. Gas and Smoke Resulting From the Welding of Ferrous Materials. (In German.) *Schweisstechnik,* v. 4, Nov. 1950, p. 121-130.

Laboratory and large-scale experiments were made to study the composition of the gases, smokes, and vapors arising from gas and electric welding, their effect on health, and methods of protection. 17 ref. (K1, K2, A7, Fe, ST)

84-K. Study of Bonded Units. J. M. Buist, C. H. Lindsey, W. J. S. Naunton, R. L. Stafford, and G. E. Williams. *Industrial and Engineering Chemistry,* v. 43, Feb. 1951, p. 373-381.

Work was undertaken because no satisfactory and discriminating test was available for evaluating rubber-to-metal bonding agents. A method was evolved which discriminates between bonding agents which have previously been regarded as equivalent. New facts such as importance of volume of the rubber rather than shape factor were uncovered. Significance of the work lies in better testing of metal-to-rubber bonding agents and better understanding of facts underlying design of rubber-metal spring units. (K11)

85-K. Gas Meter Part Production Improved Through Brazing. *Modern Machine Shop,* v. 23, Feb. 1951, p. 234, 236.

By a change from casting to brazed construction, Win Mfg. Co., East Haven, Conn., is now able to produce the part more quickly, efficiently, and economically. The part, which must be 100% gas-tight, consists of two stampings and a screw-machine part joined with a half ring of $\frac{1}{16}$-in. brazing wire. (K8)

86-K. Brazing in Salt Baths Offers Production Economies. John B. Campbell. *Materials & Methods,* v. 33, Jan. 1951, p. 64-66.

The process and its advantages for joining both ferrous and nonferrous materials. (K8)

87-K. Welded Narrow Steel Sheets Used for Wide Stampings. Kenneth Rose. *Materials & Methods,* v. 33, Jan. 1951, p. 83-84.

Savings in metal costs which followed adoption of welded sheets for producing large automotive stampings. Seam, multiple-spot, flash, and mash welding are the four procedures used. (K3, CN)

88-K. Recent Developments in Fluxes for Welding. William M. Conn. *Journal of Metals,* v. 191, Feb. 1951, p. 98-99.

Most important properties of arc welding fluxes. The three principal groups of fluxes developed for submerged-arc welding are based on use of raw clay, glass, and mullite. Preparation and advantages of the ceramic or mullite flux developed by the author. (K1)

89-K. Is the Industry's Next Big Advance Ultrasonic Welding? Thomas A. Dickinson. *Welding Engineer,* v. 36, Feb. 1951, p. 17-19.

Some developments to date such as ultrasonic soldering of Al, and inspection. (K7, S13, Al)

90-K. How We Built a Jettisonable Fuel Tank. A. H. Petersen. *Welding Engineer,* v. 36, Feb. 1951, p. 20-23, 42.

Equipment and procedures developed for forming and welding a tank 34 in. diam. by 16½ ft. long. 61S Al is used, a specially rigged drawing press, and spot and automatic arc welding. (K1, K3, G4, Al)

91-K. Seattle's New Welded Stadium. Ray Bloomberg. *Welding Engineer,* v. 36, Feb. 1951, p. 24-25.

Use of arc welding saved about 200 tons of steel by eliminating gusset plates and rivets. It also cut construction time and resulted in a stronger structure. (K1, T26, CN)

92-K. Rings From Titanium. *Welding Engineer,* v. 36, Feb. 1951, p. 29.

How Ti rings for aircraft jet engines are successfully flash-butt welded. (K3, T24, Ti)

93-K. Iron Ore Unloader. W. B. MacLean. *Welding Engineer,* v. 36, Feb. 1951, p. 30-31, 42.

Combined welded and riveted construction of 15-ton unloader. (K general, T26, CN)

94-K. Design for Welded Connections. II. T. B. Jefferson and W. J. Brooking. *Welding Engineer,* v. 36, Feb. 1951, p. 32-34.

Designing to save weld metal, maintenance of close tolerances, material and space economy of welded fastenings, strength of weld metal, and effects of external stresses upon weld joints. (K general)

95-K. 50% Saving. *Welding Engineer,* v. 36, Feb. 1951, p. 35.

By buying the steel and welding it to make its own dipper sticks, Clemens Coal Co., Pittsburg, Kans., is able to realize savings of around 50% in the cost of a stick. Use of submerged-arc welding. (K1, CN)

96-K. How to Weld Gray Cast Iron. M. J. Kellner. *Welding Engineer,* v. 36, Feb. 1951, p. 36-37.

Repair procedures using both gas and arc welding. (K1, K2, CI)

97-K. Metal Sealing Techniques for Large Television Tubes. William L. Hyde. *Radio & Television News,* v. 45, Feb. 1951, p. 38-39.

Cone is made of a special Cr-Fe alloy steel. (K11, T1, AY)

98-K. A Report on Weldability and Mechanical Properties of Manganese-Vanadium Plate Steel. T. W. Merrill. *Industry & Welding,* v. 24, Feb. 1951, p. 24-27.

Report includes micrographs, macrographs, hardness-survey diagrams, and tables. (K9, Q general, AY)

99-K. Resistance Welding Eliminates 7 Operations on Lock Assembly. *Industry & Welding,* v. 24, Feb. 1951, p. 28, 82.

Procedures at Stamford, Conn., Div., Yale & Towne Mfg. Co. (K3)

100-K. All-Welded Steel Boats. Joseph Fortunato. *Industry & Welding,* v. 24, Feb. 1951, p. 30.

Construction of small Diesel-powered boats by Welin Davit & Boat Co., Perth Amboy, N. J. (K1, T22, CN)

101-K. Easy Way to Weld Zinc Parts. L. B. White. *Industry & Welding,* v. 24, Feb. 1951, p. 34-36.

Oxy-acetylene procedure which gives satisfactory results. (K2, Zn)

102-K. Control of Distortion in Manufacture of 30-Foot Beams. *Industry & Welding,* v. 24, Feb. 1951, p. 42-43.

Combined use of specially designed welding clamps and automatic submerged-arc welding equipment recently enabled Republic Welding and Flame Cutting Co., Cleveland, to weld over 1000 ft. of specially designed bridge beams speedily and with a minimum of distortion. (K1, T26, CN)

103-K. Laboratory Controls Efficiency in Welding Program. Joseph Scandling. *Industry & Welding,* v. 24, Feb. 1951, p. 49-50.

Outlines work of laboratory of Marion Power Shovel Co. (K9, CN)

104-K. Salvaging Castings by Welding of Defects. G. E. Bellew. *Canadian Metals,* v. 14, Jan. 1951, p. 23-26, 42.

Equipment, materials, electrodes, and techniques for arc welding of mild steel, low-alloy and stainless steel castings. (K1, ST)

105-K. Development of a Synthetic Resin Adhesive Suitable for Metal-to-Metal Bonding. E. E. Barton. *Plastics Institute, Transactions,* v. 18, Oct. 1950, p. 1-21.

Factors which affect the adhesion of metal surfaces when using synthetic-resins, particularly phenolic-type cements and hardened steel surfaces. This type of cement, unmodified, is not satisfactory. Improvements in performance are achieved by modifying with a thermoplastic or slow-curing resin, by incorporation of finely divided inert fillers such as silica or alumina, and by addition of a small quantity of a wetting agent. (K12)

106-K. Subassembly Riveting; Some Applications of the Automatic Type of Machine to Airframe Units. *Aircraft Production,* v. 13, Jan. 1951, p. 12-17.

Procedures. Includes preliminary punching and dimpling operations. (K13, G2)

107-K. Synthetic Resin Adhesives for Metal Bonding. C. J. Moss. *Plastics* (London), v. 16, Jan. 1951, p. 3-6.

Emphasizes use of "Araldite" and "Redux" processes and adhesives. 10 ref. (K12)

108-K. Solders and Soldering: Some Recent Advances. H. C. Watkins. *Metallurgia,* v. 42, Dec. 1950, p. 372-376.

A descriptive review. (K7)

109-K. The Welding of Aluminium and Its Alloys. E. Barron. *Machinery Lloyd* (Overseas Edition), v. 22, Dec. 23, 1950, p. 75, 77-78.

A review. (K1, K2, Al)

110-K. Transfer of Manganese, Silicon, Phosphorus, and Sulfur From the Flux Into the Weld Metal During Automatic and Semiautomatic Welding With Coated Electrodes, 2 Mm. in Diameter. (In Russian.) B. B. Iskoz, M. R. Shraerman, and E. F. Petrov. *Avtogennoe Delo* (Welding), v. 21, Oct. 1950, p. 10-13.

Investigation for steel containing 0.35% Mn, 0.98% Si, 0.018% P, and 0.033% S showed that the content of Mn, Si, P, and S in the weld metal depends on welding conditions, particularly specific consumption of flux. Transfer of each element was investigated individually. (K1, CN)

111-K. Primary Structure and Causes of Formation of Cracks During Welding of Cromansil Steel. (In Russian.) S. V. Avakyan and N. F. Lashko. *Avtogennoe Delo* (Welding), v. 21, Oct. 1950, p. 13-16.

Method of metallographic etching to reveal the structure of weld metal and causes of crack formation. Study of five zones of thermal influence of welding shows that intensity and time of heating during atomic-hydrogen welding are intermediate between those present during arc and gas welding. (K1, M21, AY)

112-K. One-Sided Automatic Welding of Low-Carbon Steel of up to 16 Mm. Thickness. (In Russian.) N. A. Fedorov, A. I. Kuzin, and T. Ya. Shandra. *Avtogennoe Delo* (Welding), v. 21, Oct. 1950, p. 17-20.

The welding longitudinal or ring seams (as in boilers) on one side of the part being welded, using a flux "pad" on the back of the seam, was investigated. Means of supporting the "pad" against the joint. Strength characteristics of such welds, compared with those welded on both sides, were satisfactory. (K1, CN)

113-K. Method of Joining Parts by "Electrorivets". (In Russian.) S. A. Egorov. *Avtogennoe Delo* (Welding), v. 21, Oct. 1950, p. 20-24.

Characteristics of this welding method as applied to steel sheets, based on the natural properties of a stationary arc discharge operating for a short time under a layer of flux. Welding with and without rivet holes in the upper sheet was studied. Optimum conditions were determined for different cases. (K13, CN)

114-K. Investigation of the Influence of Individual Defects on Mechanical Properties of "Electroriveted" Joints. (In Russian.) M. M. Kraichik and A. V. Obukhov. *Avtogennoe Delo* (Welding), v. 21, Oct. 1950, p. 24-26.

Influences of the most frequently encountered defects (hot tears and circumferential unwelded places) in "electroriveted" parts on strength characteristics under three forms of loading. Data from tests on single-rivet specimens of low-carbon steel in thicknesses of 2-4 mm. (K13, CN)

115-K. Better Welding at Lower Cost. Part II. Lew Gilbert. *Industry & Welding*, v. 24, Feb. 1951, p. 38, 40, 66-67.

Edge preparation, positioning, jigs and fixtures, etc. (To be continued.) (K1, K2, G22)

116-K. Butt Welding Wire and Rod Economically. H. J. Chamberlain. *Wire and Wire Products*, v. 26, Feb. 1951, p. 146-147.

How wire, rod, band, and tape stock can be quickly and economically butt welded in a wide variety of shapes and forms by use of Do-All equipment. (K3)

117-K. Welding Saves Steel in Three Tall Buildings. LaMotte Grover and Alfred E. Pearson. *Engineering News-Record*, v. 146, Feb. 8, 1951, p. 35-37.

All-welded construction of frames of three multi-story buildings recently completed in Birmingham, Ala. (K1, T26, CN)

118-K. The Tensile Forces in Tightened Bolts. A. H. Stang. *Product Engineering*, v. 22, Feb. 1951, p. 118-120.

Techniques and experimental work. Effects of various factors such as lubricant used and surface condition of threads. (K13)

119-K. Bonding Butyl Rubber to Brass. R. W. Kaercher and George W. Blum. *Industrial and Engineering Chemistry*, v. 43, Feb. 1951, p. 488-493.

A testing method for evaluation of comparative bonding strength. Influence of methods of surface preparation, pickling conditions, and surface contamination on the various brass compositions. Photomicrographs illustrate the various degrees of surface uniformity. Optimum conditions for time, temperature, and pressure of cure; effect of brass composition; and relative strength obtained from different methods of surface preparation. 66 ref. (K11, Cu)

120-K. Submerged-Melt Welding With Multiple Electrodes in Series. A. R. Lytle and E. L. Frost. *Welding Journal*, v. 30, Feb. 1951, p. 103-110.

See abstract of "Series-Arc Welding", *Welding Engineer*, item 37-K, 1951. (K1, L24, SS, Cu, Ni)

121-K. 1950 Adams Lecture: Dynamic Characteristics of D.-C. Welding Machines. Charles H. Jennings. *Welding Journal*, v. 30, Feb. 1951, p. 117-138.

Electrical characteristics of a welding machine, regardless of type of electrodes used, are a determining factor in results obtained. Dynamic characteristics are more important than the static volt-ampere curve. Current overshoot or surge was shown to have an important influence on ability of a d.c. welding machine to hold a short arc. Minimum dynamic characteristic, as determined by current droop, has an important influence on ability to maintain an arc at low electrode-current densities. Results of weld tests on mild-steel plates. (K1, CN)

122-K. Tubular Sections in Frame Design of Hydraulic Benders. E. J.

DeWitt, F. J. Lammers, and F. D. Alexander. *Welding Journal,* v. 30, Feb. 1951, p. 139-143.

Welded construction of the equipment, which is composed of structural beams and pipes. (K general, T5, CN)

123-K. Crack Sensitivity of Aircraft Steels. J. Koziarski. *Welding Journal,* v. 30, Feb. 1951, p. 163-166.

Discusses paper by A. N. Steinberger, B. J. De Simone, and J. Stoop (Sept. 1950 issue; see item 565-K, 1950). A case which does not agree with other authors' findings. SAE 4130 Cr-Mo steel in 0.049-in. sheets was welded and tested. Three lots of only nominal differences in composition gave anomalous results. Two satisfied an Army-Navy specification, but had poor weldability characteristics; while the third did not satisfy the specification, but had satisfactory weldability. 10 ref. (K9, AY)

124-K. "Heliarc" Welding in Production. Robert Bowman. *Welding Journal,* v. 30, Feb. 1951, p. 167-168.

Discussion of paper by T. E. Piper (Sept. 1950 issue; see item 560-K, 1950). Investigation of the energy generated at the arc in helium and in argon and also the ease with which a stable arc could be established in the two gases. Results indicate that argon is more suitable than He for hand welding thin gages of stainless steel sheet. The arc in argon can be established at lower currents and also the arc drop is half of that in He for the same current. (K1, SS)

125-K. Food Cabinet Production Jumps 2600% Through Use of Resistance Welding. *Welding Journal,* v. 30, Feb. 1951, p. 171.

How cabinets and gas and electric ranges can be designed for fabrication by resistance welding to effect enormous production increases and consequent lowering of costs. (K3, CN)

126-K. Hints on How to Weld Sheet Lead. E. J. Chester. *Welding Journal,* v. 30, Feb. 1951, p. 173-174.

Instructions for torch welding. (K2, Pb)

127-K. Adjusting the Oxyacetylene Flame. R. G. Harner. *Welding Journal,* v. 30, Feb. 1951, p. 175-176.

Illustrated directions for various types of work. (K2, G22)

128-K. How to Bring Worn Parts Back to Life. E. A. Shevey. *Welding Journal,* v. 30, Feb. 1951, p. 180.

Braze-welded sprockets and gears. Practical hints on procedure. (K8, CN)

129-K. Salvage of Castings by Welding of Defects. G. E. Bellew. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 669-674.

Previously abstracted from preprint. See item 294-K, 1950. (K1, E general, ST, SS, CI)

130-K. Fabrication in Britain; A Survey of Ten Years' Progress. *Welding & Metal Fabrication,* v. 19, Jan. 1951, p. 2-10.

Refers almost exclusively to welding developments. (K general)

131-K. New Tube Factory for Liverpool. *Welding & Metal Fabrication,* v. 19, Jan. 1951, p. 25-27.

Weld fabrication of factory building. (K1, T26, CN)

132-K. Welding Metals With Separate Melting Processes. V. P. Nikitin. *Welding & Metal Fabrication,* v. 19, Jan. 1951, p. 28-30. (Translated from *Doklady Akademii Nauk SSSR* (reports of the Academy of Sciences of the USSR), v. 56, No. 5, 1947, p. 477-480.)

New method which utilizes two independent heat sources for melting base and filler metals. A concentrated source of heat is used to heat and fuse to a predetermined depth the surface of the parent metal. At the same time a continuous or discontinuous stream of molten filler metal which has been melted in a separate melting device is fed into the molten-metal pool on the surface of the base metal. (K6)

133-K. A Survey of Modern Theory on Welding and Weldability. (Series continued) D. Seferian. *Sheet Metal Industries,* v. 28, Jan. 1951, p. 59-72, 76.

Confined to the principal engineering and structural steels including: Cr-Mo steels for aircraft construction; low-alloy, Cu-Cr steels used in bridges and structures; Ni-Cr-Mo self-hardening steels; and austenitic, 18-8 Ni-Cr stainless steels. (To be continued.) (K9, AY, SS)

134-K. Bonding of Rubber to Metal. C. J. Moss. *British Plastics,* v. 24, Jan. 1951, p. 22-26.

"Redux" process which does not require the preliminary brass-plating process. A phenolic resin and a polyvinyl formal powder are used to develop a strongly adhesive bond. The rubber surface must be treated with concentrated H_2SO_4 for a short time, and the metal surface must also be suitably prepared. Bond-strength data for different rubber-metal combinations. (K11)

135-K. Reclamation of Castings. *Foundry Trade Journal,* v. 90, Jan. 25, 1951, p. 95-100.

Discussion of Reports T.S.23 and T.S.26 of the Institute of British

Foundrymen on gray iron and nonferrous castings respectively. Repair procedure in the foundry using burning, welding, brazing, soldering, annealing, impregnation, calking and plugging, and plating and metal spraying. (K general, E general)

136-K. (Pamphlet) **Safety in Electric and Gas Welding and Cutting Operations.** 44 pages, 1950. American Welding Society, 33 W. 39th St., New York 18, N. Y. 50c.

This "American Standard" is divided into eight sections as follows: scope of the standard, definition of terms, installation and operation of arc welding, installation and operation of gas welding and cutting, installation and operation of resistance welding, fire prevention and protection, protection of personnel, and ventilation and health protection. Bibliography. (K1, K2, K3, A7)

137-K. (Book) **Welded Deck Highway Bridges.** James G. Clark, editor. 247 pages. 1951. James F. Lincoln Arc Welding Foundation, 12818 Coit Rd., Cleveland. $2.00.

Ideas presented in connection with the 1949 contest sponsored by the Foundation covering the best way to make an all-welded, 120-ft. deck highway bridge. Structural types, floor systems, new sections, special connections and details, and quantity and costs. (K general, T26)

138-K. (Book) **Philips Practical Welding Course.** Ed. 2. 225 pages. Philips Electrical, Ltd. (Industrial Dept.), Century House, Shaftesbury Ave., London W. C. 2, England. 7s., 6d.

Essentials of arc welding. Every phase of arc welding from its fundamental principles and practical welding technique to weld examination and cost estimation. (K1)

139-K. Engineering Aspects of Tool and Die Welding. Part III. Arthur R. Butler. *Tool Engineer,* v. 26, Feb. 1951, p. 40-42.

Recommended procedures for repairing toolsteel units by arc welding. (K1, T6, TS)

140-K. Soiders and Brazing Materials. *Materials & Methods,* v. 33, Jan. 1951, p. 97, 99; Feb. 1951, p. 97, 99. (Adapted from data to appear in "Materials Technology for Electron Tubes", by W. H. Kohl, to be published by Reinhold Publishing Corp.)

Tables include names of materials and suppliers, compositions, applicable fluxes, melting and flow points, and remarks. (K7, K8, T5)

141-K. Silver Brazing Eases Shotgun Wedding. Kenneth Ireland. *American Machinist,* v. 95, Feb. 19, 1951, p. 164-165.

Use of silver brazing in manufacture of shotguns. One model has five subassemblies comprising six Ag alloy brazed joints. An alloy of Ag-Cu-Cd-Zn with a flow point of 1145° is used for all of these joints. (K8, AY, Ag)

142-K. Some Pointers on Soldering Monel. *Sheet Metal Worker,* v. 42, Feb. 1951, p. 30-31.

(K7, Ni)

143-K. "Redux" Adhesive Process for Metals. F. H. Parker. *Engineering,* v. 171, Feb. 2, 1951, p. 144-146. (Excerpt from lecture.)

Commercial application of Redux process for joining Al alloys. (K12, Al)

144-K. Welding Fixtures for Magnesium Aircraft Components. G. C. Close. *Machinery* (London), v. 78, Feb. 1951, p. 193-197.

(K1, Mg)

145-K. Production of Trailer-Body Components by Resistance Welding. A. I. Nussbaum. *Sheet Metal Industries,* v. 28, Feb. 1951, p. 167-173, 182.

Use of the "Shotweld" process at Budd Co., Philadelphia. Material is stainless steel. (K3, T21, SS)

146-K. Some Aspects of Continental Welding Practice as Reported by Members of the Recent Tour Organized by S.A.S.M.U.T.A. *Sheet Metal Industries,* v. 28, Feb. 1951, p. 175-178.

(K general)

147-K. Great Increase in Spot-Welding Speeds Made Possible by the Use of New Equipment. *Sheet Metal Industries,* v. 28, Feb. 1951, p. 179-182.

Use of multi-point machines in Britain. (K3)

148-K. Magnesium Assembly Methods. *Magazine of Magnesium,* Feb. 1951, p. 8-11.

Welding, riveting, brazing, cementing, bolts, screws, etc., for joining Mg sheet. (K general, Mg)

149-K. New Copper Paste Permits Brazing Economies. Kenneth Rose. *Materials & Methods,* v. 33, Feb. 1951, p. 79-80.

Hand labor and waste are largely eliminated by using Cu brazing paste for joining steel parts instead of pre-placed forms. (K8, ST, Cu)

150-K. Ultrasonic Soldering Irons. B. E. Noltingk and E. A. Neppiras. *Journal of Scientific Instruments,* v. 28, Feb. 1951, p. 50-52.

Two instruments developed to facilitate the tinning of Al and other light-metal surfaces. One is designed to be used in the conventional manner and is suitable for soldering thin sheet; in the other, the vibrations are communicated to a solder bath in which small pieces of metal and

also foil and wires can be tinned by dipping. (K7, Al)

151-K. The Removal of Enamel From Copper Wire. T. P. Gill and M. L. Hume. *Journal of Scientific Instruments,* v. 28, Feb. 1951, p. 60-61.

Problem is important when enameled Cu wire is to be soldered. The enamel can be effectively stripped by immersing for a short period in chloracetyl chloride at room temperature. (K7, L12)

152-K. Welding Replaces Soldering and Increases Production. Herbert Chase. *Iron Age,* v. 167, Mar. 1, 1951, p. 114-117.

Engineers of Delco-Remy Div., General Motors Corp., have concluded that welded joints, or those termed "braze-welds," are preferable to most other types, including those made by soldering and tubular riveting, except where the joints may have to be broken for service work. Conclusions apply particularly to starting, lighting, ignition, and related equipment involving a variety of metals and alloys. Several interesting setups. (K8)

153-K. Report of Special Committee on Continuous Welded Rail. H. B. Christianson. *American Railway Engineering Association Bulletin,* v. 52, Feb. 1951, p. 589-594.

Mainly a bibliography arranged by year of publication.
(K general, T23, CN)

154-K. Report on Assignment 4. Rail End Batter. Causes and Remedies. R. P. Winton, chairman. *American Railway Engineering Association Bulletin,* v. 52, Feb. 1951, p. 629-633.

Part of Report of Committee 4 on Rail. Tests on various methods of building up rail ends by welding on the Richmond, Fredericksburg and Potomac Railroad near Penola, Va., in May 1941.
(K general, S21, T23, CN)

155-K. Some Maintenance Jobs You Can Do With Cold Pressure Welding. *Power Engineering,* v. 55, Feb. 1951, p. 95-96.
(K5)

156-K. Shielded Arc Welding. James Blane. *Western Machinery and Steel World,* Feb. 1951, p. 81-83.

Argon metal-arc welding equipment, procedures, and applications. (K1)

157-K. Heliarc Welding Finds Its Stride. Gilbert C. Close. *Modern Machine Shop,* v. 23, Mar. 1951, p. 84-90, 92, 94.

Developed some 10 years ago for welding Mg, the Heliarc process is being successfully used today in the welding of alloy steels, Ni, Al, and Cu. Typical applications. (K1)

158-K. Engineering Aspects of Tool and Die Welding. Part IV. Arthur R. Butler. *Tool Engineer,* v. 26, Mar. 1951, p. 60-62.

Fabrication of die units from common SAE steels with hard facing applied to cutting edges and working areas. Selection of rods for metallic-arc welding repair. Atomic-hydrogen arc welding as applied to tools and dies. (K1, L24, TS)

159-K. Elements of Resistance Welding. A. E. Rylander. *Tool Engineer,* v. 26, March 1951, p. 67-74.
Special report. (K3)

160-K. British Metals Adhesive Uses. C. J. Moss. *Aviation Week,* v. 54, Mar. 5, 1951, p. 30, 32-35, 37.

British "Redux" process and its uses. (K12)

161-K. Stubbing Drill Collars by Thermit Welding. Roy F. Carlson. *Oil and Gas Journal,* v. 49, Mar. 8, 1951, p. 70-71, 84.

Process borrowed from the railroad and heavy-machinery industries used to prolong the useful life of drill collars. (K4, ST)

162-K. Welding Light Metals With Inert Gas Shielded Arc. Part II. W. Wade Moss, Jr. *Light Metal Age,* v. 9, Feb. 1951, p. 16-18.

Recommendations applicable to Al, Mg, and Ti. (K1, Al, Mg, Ti)

163-K. Alcoa Reports—Fabrication & Application Advancements During 1950. Wm. McCague. *Light Metal Age,* v. 9, Feb. 1951, p. 19-25.

Pressure welding, rolling of tapered sheet, and a wide variety of new applications of Al and its alloys. (K2, G11, T general, Al)

164-K. Every Welding Shop Needs Tempilstiks. Hugo W. Hiemke. *Victor Weld,* Jan.-Feb. 1951, p. 4-6.

Use of above temperature-indicating crayons for accurate control of preheating temperatures. Includes "metal-preheating chart."
(K general, S16)

165-K. The Silver Brazed Pipe Line. John B. Ross. *Canadian Metals,* v. 14, Feb. 1951, p. 41, 43.

Procedure, advantages, and applications of the product. (K8)

166-K. Welding; The Modern Application of the Metallic Arc Process. *Automobile Engineer,* v. 41, Feb. 1951, p. 75-76. (From paper by G. Cubitt-Smith.)

Concerned largely with steel. Automatic processes; metallurgical considerations; induced stresses; and effect of alloying elements. (K1, ST)

167-K. The Welding of Aluminium Alloys, Particularly for Structural Applications. W. K. B. Marshall. *Trans-*

actions of the Institute of Welding, v. 13, Dec. 1950, p. 178-185.

Properties of the alloys and the basic metallurgy of the welded joints. Advantages and disadvantages of the various welding processes applicable to the above and some comments on the influence of welding on design of Al-alloy structures. 12 ref. (K general, T26, Al)

168-K. Squeeze-Riveting; Equipment for Flush-Riveted Fuselage-Skin Panels for the Bristol Type 175 Aircraft. *Aircraft Production,* v. 13, Feb. 1951, p. 41-48.

(K13, Al)

169-K. Metal-Stitching: A Review of the Possibilities of the Process; Strength-Characteristics and Applications. C. A. H. Pollitt. *Aircraft Production,* v. 13, Feb. 1951, p. 62-64.

Joining of leather or asbestos to Al, rubber to stainless steel, and textile fabrics to Al are typical examples. (K13)

170-K. Aspects of Fabrication in the Manufacture of Electrical Power Plant. H. H. Reeve. *Welding and Metal Fabrication,* v. 19, Feb. 1951, p. 44-49.

Welding equipment and procedures at a British plant. Consists entirely of large steel members. (K general, T25, CN)

171-K. Sea-Going Motor Launches Built Near London. J. V. Thomas. *Welding and Metal Fabrication,* v. 19, Feb. 1951, p. 68-70.

Welded construction utilizing mild steel. (K general, T22, CN)

172-K. The Welding of Pressure Vessels. H. Harris. *Welding and Metal Fabrication,* v. 19, Feb. 1951, p. 70-73.

Forming, welding and inspection practice. Supersonic examination. (K general, S13, T26, ST)

173-K. Physical Aspects of Weldability of Glass to Metal in the Electron-Tube Industry. III. Influence of Shape Variation and Certain External Variables on Stresses Developed in the Welds; Applications and Conclusions. (In French.) Georges Trébuchon and Jacques Kieffer. *Verres et Réfractaires,* v. 4, Dec. 1950, p. 356-366.

Effects of shape, also of factors such as humidity, thermal shock, annealing atmosphere, electrical phenomena, etc. Methods for minimizing such effects. Fields of application of the results. 22 ref. (K11)

174-K. The Atomic-Hydrogen Torch. (In French.) Louis Hackspill and Jean Cueilleron. "Les hautes Températures et leurs Utilisations en Chimie, Vol. I" (Masson et Cie., Paris), 1950, p. 198-224.

Comprehensive review of literature on principles; equipment; physical and chemical properties of atomic hydrogen; and applications, which include welding, production of metallic Mg by hydrogen reduction, and various industrial chemical processes. 468 ref. (K1, C2, Mg)

175-K. The Hydrogen-Fluorine Torch. (In French.) J. Cueilleron. "Les hautes Temperatures et leurs Utilisations en Chimie, Vol. II" (Masson et Cie., Paris), 1950, p. 1303-1304.

Temperatures in the neighborhood of 4000° C. are obtained. Application to welding and cutting of various metals. (K2, G22)

176-K. Progress in the Development of Automatic Welding Under Flux in the Past 2-3 Years. (In Russian.) E. O. Paton. *Avtogennoe Delo* (Welding), v. 21, Nov. 1950, p. 3-8.

Research and developments of recent years in increasing the quality of welded structures from low-carbon steel; improving the technique of automatic welding of carbon, low-alloy, and alloy steels; developing more effective methods of automatic and coated-electrode-wire welding under flux; and improving automatic welding apparatus. (K1, CN, AY)

177-K. High-Production Methods of Welding Developed by "TsNIITMASh MTM". (In Russian.) K. A. Udotov. *Avtogennoe Delo* (Welding), v. 21, Nov. 1950, p. 8-14.

Progress of the welding section of the Central Heavy-Machinery Institute of the U.S.S.R. with respect to new processes, equipment for automatic welding under flux, electrodes for welding low-carbon steels, electrodes for welding steels with special properties, equipment for mechanized production of electrodes, and contact welding. (K1, ST)

178-K. High-Production Methods of Welding in Boiler Construction. (In Russian.) I. D. Davydenko. *Avtogennoe Delo* (Welding), v. 21, Nov. 1950, p. 14-17.

Introduction of automatic welding into boiler production, rapid welding with exposed arc, and contact butt welding. A new universal, 3-electrode, 3-phase automatic welding head. Operating characteristics and prospects of further development. (K1, CN)

179-K. High-Production Methods for Welding Large-Capacity Freight Cars. (In Russian.) N. D. Portnoi. *Avtogennoe Delo* (Welding), v. 21, Nov. 1950, p. 17-19.

Application of automatic welding under flux and of manual arc welding using large-diameter electrodes to production of freight cars. Opti-

mum conditions of operation. (K1, CN)

180-K. High-Speed Double-Arc Automatic Welding. (In Russian.) B. I. Medovar. *Avtogennoe Delo* (Welding), v. 21, Nov. 1950, p. 20-23.

Apparatus and procedure. Fundamental advantages of double-arc welding, in which one electrode is held perpendicular to the weld and the other is inclined to it, include division of total power required for high-speed welding between two arcs, decrease of welding current required for each arc, use of electrode wire of not over 6-mm. diameter, and possibility of using ordinary vitreous fluxes. 10 ref. (K1)

181-K. Application of Electric-Arc Welding to Large Structures. (In Russian.) V. I. Mel'nik. *Avtogennoe Delo* (Welding), v. 21, Nov. 1950, p. 23-26.

Advances of the post-war 5-year plan in application of automatic arc welding to heavy construction, for instance, spherical gas storage tanks, blast furnaces, etc. Problems yet to be solved. (K1, CN)

182-K. Electrodes With High-Quality Coatings and Their Production. (In Russian.) E. V. Sokolov. *Avtogennoe Delo* (Welding), v. 21, Nov. 1950, p. 26-29.

Results of several investigations in the technology of electrode production, including utilization of mass-production techniques and development of special types of electrodes. (K1, T5)

183-K. Automatic Welding of Copper Under Flux. (In Russian.) N. A. Olshanskii. *Avtogennoe Delo* (Welding), v. 21, Nov. 1950, p. 30-32.

Method and apparatus. Welding Cu by use of a carbon arc under flux produces a high-quality weld, does not require preheating, and guarantees high productivity. Automatic welding setup and operating characteristics for sheet thicknesses up to 8 mm. (K1, Cu)

184-K. How to Weld Aluminum. *Sheet Metal Worker,* v. 42, Feb. 1951, p. 41-44; Mar. 1951, p. 46-49, 54.

Detailed instructions for various sheet Al alloys. (K general, Al)

185-K. Arc-Welding Stainless Steel Without Columbium. Richard K. Lee. *Machinery* (American), v. 57, Mar. 1951, p. 191-192; **Stainless Arc Welded Without Columbium,** *Steel,* v. 128, Mar. 19, 1951, p. 71-72.

How corrosion resistance may be obtained without use of Cb by welding extra-low-carbon steels with extra-low-carbon electrodes. (K1, SS)

186-K. How Britain Builds Tanks. *Machinery* (American), v. 57, Mar. 1951, p. 143-151.

Miscellaneous fabrication equipment and procedures—mainly welding and machining set-ups. (K general, G17, CN)

187-K. Brazing and Bronze Welding in Maintenance and Manufacture. *Machinery* (American), v. 57, Mar. 1951, p. 180-183.

Typical applications for both types of work. Recommended practices. (K8)

188-K. Induction Heating Successfully Solders Aluminum. C. H. Yetman. *Iron Age,* v. 167, Mar. 15, 1951, p. 108-109.

Setup which provides uniform heat diffusion and eliminates oxidation problems. A high-strength bond was obtained at a rate of 320 pieces per hr. (K7, Al)

189-K. Welding Quality Control in a Petroleum Refinery. A. F. Blumer. *Welding Journal,* v. 30, Mar. 1951, p. 235-243.

(K9, S12)

190-K. Nickel Portion of A.W.S. 1950 Educational Lecture Series. R. M. Wilson, Jr. *Welding Journal,* v. 30, Mar. 1951, p. 247-256.

Properties of high-Ni alloys, and procedures using metal-arc, inert-gas metal-arc, atomic-hydrogen, gas, and resistance welding; and brazing and cutting. (K general, G22, Ni)

191-K. Suggested New Welding Standards. David Arnott. *Welding Journal,* v. 20, Mar. 1951, p. 257.

Discusses paper by James F. Lincoln (Sept. 1950 issue; item 558-K, 1950). Indicates that the problem is not as simple as stated by Mr. Lincoln. (K9, S22)

192-K. Arc Welding in Home Building. John D. Bert. *Welding Journal,* v. 30, Mar. 1951, p. 263-264.

How arc welding can be applied to on-the-spot construction of steel homes of conventional and varied designs. (K1, T26, CN)

193-K. Automatic Welding on Propane Tanks. C. G. Herbruck. *Welding Journal,* v. 30, Mar. 1951, p. 268.

Good fixturing is speeding the automatic hidden-arc welding of propane cylinders at Creamer and Dunlap, Tulsa, Okla. (K1, ST)

194-K. Aircomatic Welding of Nickel and Stainless-Clad Steels. T. T. Watson and R. R. Rothermel. *Welding Journal,* v. 30, Mar. 1951, p. 116s-122s.

Details of development of procedures. Hardness survey plots and bend-test specimens. (K1, K9, Ni, SS, CN)

195-K. Some Research Techniques for Studying Arcs in Inert Gases. R. H. Gillette and R. T. Breymeier. *Weld-*

ing Journal, v. 30, Mar. 1951, p. 146s-152s.

Some selected techniques for obtaining fundamental data on inert-gas-shielded welding arcs. Interpretations of some of the phenomena observed. (K1, K9)

196-K. Hidden Arc Welding Done in Any Position. *Steel*, v. 128, Mar. 19, 1951, p. 76, 78.

Setup developed by Lincoln Electric Co. The joint is stationary as two electrodes are moved along opposite sides of work. Flux is carried on a moving belt so it is stationary in relation to the work. (K1)

197-K. Use of Welding to Facilitate Piping Suspension and Support. George W. Hauck. *Heating, Piping & Air Conditioning*, v. 23, Mar. 1951, p. 83-87.

A variety of examples. (K general, T27, CN)

198-K. Giant Welded Pipeline. W. J. Granberg. *Industry & Welding*, v. 24, Mar. 1951, p. 30, 33.

Steel-lined Soap Lake siphon in Eastern Washington is over 22 ft. in diam. Forming, handling, and automatic welding procedures and equipment. (K1, CN)

199-K. Design of Welding Fixtures. Hans W. Smith. *Industry & Welding*, v. 24, Mar. 1951, p. 34-36, 39.

Clarified by diagr ıs. (K general)

200-K. Organizati for Quality Fabrication. A. Gr ıer. *Industry & Welding*, v. 24, Mar. 1951, p. 44-46, 48-49, 56-57.

Manual arc welding procedures and equipment of Alloy Fabricators, Perth Amboy, N. J., manufacturers of stainless steel equipment. Includes forming, heat treatment and inspection. (K1, A5, SS)

201-K. Stamped Torque Converter Breeds Production Problems. *SAE Journal*, v. 59, Mar. 1951, p. 17-21. (Based on "Problems Involved in Joining Sheet Metal for Torque Converters," by H. O. Flynn).

Choice of material for vaned members of the Chevrolet converter was narrowed down to three—cast iron, aluminum, and sheet steel. Fabricating methods tried and abandoned with each. Use of sheet-steel stampings joined by copper brazing was finally chosen. (K8, T21, ST)

202-K. Stud Welding to Ferrous and Nonferrous Metals. T. L. Hufert, P. F. Powder, and J. Nater. *Product Engineering*, v. 22, Mar. 1951, p. 89-91.

Question-and-answer survey. (K1)

203-K. Tricky Welding at Tecler. Howard E. Jackson. *Welding Engineer*, v. 36, Mar. 1951, p. 17-19, 22.

Manufacture of window frames by welding Al extruded sections at Tecler Aluminum Products, Seattle, Wash. Gas welding, metal-arc welding and inert-arc welding are used. (K1, K2, A1)

204-K. Braze Welding a 13-Ton Casting. Francis L. Maier. *Welding Engineer*, v. 36, Mar. 1951, p. 20-22.

Altogether, 325 lb. of Mn bronze were deposited in a crack 2 ft. long. (K8, CI)

205-K. Lighter Weight Means Less Labor. J. R. Thorpe. *Welding Engineer*, v. 36, Mar. 1951, p. 23.

Arc-weld fabrication of Mg dockboards for ship loading and unloading. (K1, Mg)

206-K. Controlled Explosions Test Welded Plates. Jack Medoff. *Welding Engineer*, v. 36, Mar. 1951, p. 24-25.

Direct-explosion test procedure for evaluating the performance of armor and ship-plate weldments. Unlike the conventional ballistic test, it is not affected by the variables inherent in a method that depends upon projectile impact. (K9, ST)

207-K. They Hung From the Roof to Build the Walls. Margaret Ralston. *Welding Engineer*, v. 36, Mar. 1951, p. 26-27.

Arc weld fabrication of large gas holder. Welders worked from three levels of scaffolding lifted by a new kind of "sky hook"—the roof on an air-pressure elevator. (K1, T26, CN)

208-K. Monel Outboard for Salt Water. Harold Schrock. *Welding Engineer*, v. 36, Mar. 1951, p. 28-29.

Use of spot and seam welding to make watertight seals in Monel rowboats. (K3, T22, Ni)

209-K. How Northrop Aircraft, Inc., Standardizes Its Flash Welding. Fred M. Burt. *Welding Engineer*, v. 36, Mar. 1951, p. 30-33.

Details of welding, inspection, and testing procedure. (K3, S13)

210-K. Capacitor-Operated Stud Welders. *Welding Engineer*, v. 36, Mar. 1951, p. 36-37.

Unit developed by Graham Mfg. Corp., Ferndale, Mich., to permit high-production welding operations. This equipment will weld studs to very thin plated or painted metals and can be used to weld dissimilar metals. (K1)

211-K. Joining Cast Iron. C. O. Burgess. *Machine Design*, v. 23, Mar. 1951, p. 129-131. (Based on "Welding, Joining and Cutting Gray Iron," to be published by Gray Iron Founders' Society.)

Development of gas and arc welding and brazing processes for the cast iron. Applicability of each process. (K1, K2, K8, CI)

212-K. Procedure for the Welding of Staybolts. Floyd R. Seeley. *Proceed-*

ings, Master Boiler Makers' Association, 1950, p. 98-102; disc. p. 102-109.

Recommended procedure, including preliminary steps. Experiences of different railroads. Compares results obtained with various alloy steels. Arc welding is apparently used. (K1, AY)

213-K. Special Devices up Welding Efficiency. Walter Rudolph. *Iron Age,* v. 167, Mar. 22, 1951, p. 70-71.

How maximum efficiency in heavy welding operations is obtained by good plant layout and special equipment at National Tank Co.'s new plant. Both built-in and portable setups have been designed and built to mount manual and automatic hidden-arc welding heads. This equipment simplifies and speeds heavy welding of large tanks and pressure vessels. (K1, T26, ST)

214-K. Investigation Into Automatic Three-Phase Arc-Welding. G. P. Michailov, B. S. Bril, and E. I. Bobrov. *Engineers' Digest,* v. 12, Feb. 1951, p. 56-57. (Translated and condensed.) Previously abstracted from *Avtogennoe Delo.* See item 601-K, 1950. (K1, CN)

215-K. Steel Ball Holds Nitrogen at 5500 Psi. *Aviation Week,* v. 54, Mar. 26, 1951, p. 28, 31; **Stainless Steel Fabricated from Shaped Plates,** *Steel,* v. 128, Mar. 26, 1951, p. 82; **Welded Spheres Solve Liquid Nitrogen Storage.** *Iron Age,* v. 167, Mar. 29, 1951, p. 86-88.

Welded "Nitro-Sphere" for servicing rocket-powered craft which weighs about 7500 lb., and holds 200 gal. of liquid N_2. Material is $\frac{1}{8}$-in. stainless steel plate and the sphere is 54 in. in diameter. (K1, G1, SS)

216-K. Prefabricating Channel Tank Tops. J. W. Massenburg. *Marine Engineering and Shipping Review,* v. 56, Apr. 1951, p. 55-58.

Arc welding procedures and equipment at Rud Machine Co., Cleveland. (K1, T26, CN)

217-K. Welding Saves Structural Steel. Part I. Case Histories (anon.). **Part II. Prospects for Material and Cost Savings.** T. R. Mullen. *Architectural Record,* v. 109, Mar. 1951, p. 144-146.

Part I: pictures plus captions. Part II: economies. (K general, T26, CN)

218-K. Color-Match Welding Solves Musical Instrument Fabrication Problem. L. D. Richardson. *Materials & Methods,* v. 33, Mar. 1951, p. 82-83.

Specialized techniques used for torch welding in fabrication of brass musical instruments by F. A. Reynolds Co., Cleveland. (K2, T9, Cu)

219-K. New Welding Process Ends Limitation in Automatic Hidden Arc Welding. *Western Machinery and Steel World,* Mar. 1951, p. 81.

Patented process known as "3 o'clock" welding developed by Lincoln Electric Co. Horizontal seams are welded from both sides simultaneously. The joint is stationary as two electrodes are moved along opposite sides of work. Flux is carried on a moving belt so that it is stationary in relation to the work. (K1, ST)

220-K. Fluxless Welding With the Electric Needle at Ryan. W. P. Brotherton. *Western Machinery and Steel World,* Mar. 1951, p. 84-86.

Use of Heliarc welding by Ryan Aeronautical Co. for joining a variety of nonferrous metals and alloys. (K1, EG-a)

221-K. Spot Welding in Aircraft Construction. Fred Hemstreet. *Western Machinery and Steel World,* v. 42, Mar. 1951, p. 90-91.

Procedures for production spot welding of Al alloys at the El Segundo plant of Douglas Aircraft. (K3, Al)

222-K. Application of Down-Draft Exhaust Ventilation as Used in Automatic High-Speed Soldering of Metal Containers. E. D. Sallee and R. B. Carter. *Heating and Ventilating,* v. 48, Mar. 1951, p. 61-64.

Arrangement for local exhaust ventilation. (K7, CN)

223-K. Solders Developed That Conserve Tin. *Canadian Mining Journal,* v. 72, Mar. 1951, p. 65.

Work of Metals Conservation Committee, Federated Metals Div., American Smelting and Refining Co. Extensive research results indicate that silver is the only metal readily available in volume that can be satisfactorily substituted for part of the tin in solder. (K7, Sn, Ag)

224-K. Successful Re-Design of Welded Joints to Eliminate Enamel Defects in Sheet Metal Cooker Ovens. F. J. McCulloch. *Sheet Metal Industries,* v. 28, Mar. 1951, p. 267-268, 271.

Includes diagrams and illustrations. (K general, L27, CN)

225-K. Production at the Pressed Steel Company. *Welding and Metal Fabrication,* v. 19, Mar. 1951, p. 84-90.

Welding and miscellaneous presswork at British firm which manufactures automobile bodies. (K general, G1, CN)

226-K. A Visit to a Leading British Manufacturer: Steel Furniture Production. *Welding and Metal Fabrication,* v. 19, Mar. 1951, p. 99-100.

Spot, seam, and arc welding operations. (K1, K3, CN)

227-K. Forming Aluminium for Welding and Brazing. J. C. Bailey. *Welding and Metal Fabrication,* v. 19, Mar. 1951, p. 101-109.

Mechanical properties of Al and its various alloys. Forming methods and welding methods. Recommended designs.

(K general, F general, G general, Al)

228-K. Present Status of Brown Boveri Arc Welding Equipment. H. Kocher. *Brown Boveri Review,* v. 37, July 1950, p. 228-243.

Welding machines, welding transformers, automatic arc welders, and multi-operator arc-welding plants. (K1)

229-K. A.C. or D.C. for Welding? H. Kocher. *Brown Boveri Review,* v. 37, July 1950, p. 244-247.

Factors to be considered in making a choice. (K1)

230-K. Automatic Arc Welding in Industry. A. Smarcan. *Brown Boveri Review,* v. 37, July 1950, p. 248-254.

The main conditions for applying automatic arc welding and some completed installations. (K1)

231-K. Chemical Composition of Austenitic Electrodes and Crack Susceptibility of Weld Deposits. R. Montandon. *Brown Boveri Review,* v. 37, July 1950, p. 255-264.

Present status of austenitic electrodes for welding low and high-alloy steels. Crack susceptibility based on the literature and on tests in Brown Boveri laboratories. (K1, AS)

232-K. Three-Phase Arc Welding. (In Russian.) G. P. Mikhailov, A. A. Kirillova, V. V. Stepanova, and N. M. Leleko. *Promyshlennaya Energetika* (Industrial Power), v. 7, Dec. 1950, p. 9-11.

Basic principles of 3-phase arc welding, automatic 3-phase arc welding under flux, and technical-economic factors. Automatic apparatus. (K1)

233-K. Is Furnace Brazing Just as Good? Samuel Damon. *American Machinist,* v. 95, Apr. 2, 1951, p. 98-100.

Exhaustive tests with a variety of brazing alloys on Cu, brass, and steel which indicate that furnace brazing will produce a shear strength at least as high as other brazing methods. (K8, Cu, ST)

234-K. 40 Spotwelds at Once, Electronically. Charles Studer. *American Machinist,* v. 95, Apr. 2, 1951, p. 119.

Welder that joins hot-section stiffening ribs to steel panels to make movable office walls. The unusual machine, built especially for this job, fires up to 40 welding tips in a progressive cycle; making clean, hard-to-detect joints on 3-in. centers on panels as wide as 64½ in. (K3, ST)

235-K. Engineering Aspects of Tool and Die Welding. Part V. (Concluded.) **Oxyacetylene Welding Tools and Dies.** Arthur R. Butler. *Tool Engineer,* v. 26, Apr. 1951, p. 45-46.

(K2, T6, TS)

236-K. Slope Control Aids AC Welding of Aluminum. Charles Bruno and G. W. Birdsall. *Iron Age,* v. 167, Apr. 5, 1951, p. 100-101.

New electronic control which makes possible good-quality resistance welds with conventional single-phase 60-cycle a.c. equipment. Tip aluminum pickup is reduced, and electrode life increased 20-30 times. (K3, Al)

237-K. 84 Complete Bodies Per Hour. Ed Nelson. *Industry & Welding,* v. 24, Apr. 1951, p. 24-26.

Procedures at Chrysler Corp., utilizing about 85% resistance, 10% metallic and inert-arc, and 5% oxy-acetylene welding. (K3, K1, K2, T21, CN)

238-K. The Silver Brazed Pipe Line. John B. Ross. *Industry & Welding,* v. 24, Apr. 1951, p. 44-46, 78-79.

Procedure and application to Cu and steel water, gas, and fuel lines. (K8, CN, Cu)

239-K. Thermit Takes Over Where a Foundry Leaves Off. *Industry & Welding,* v. 24, Apr. 1951, p. 58, 84.

Use of thermit welding to put a new ingot-stripper stand housing into service for a large steel plant in the Pittsburgh district. (K4, CN)

240-K. Booster Simplifies Welder Design. *Applied Hydraulics,* v. 4, Apr. 1951, p. 28-29.

Airdraulic cylinder on a special spot welding machine which permits use of smaller gun units and reduces the number of components in the power circuit. (K3)

241-K. Metal Adhesive Processes. F. H. Parker. *Journal of the Royal Aeronautical Society,* v. 2, Feb. 1951, p. 153-167; disc. p. 167-168.

Practical aspects of the method. (K12)

242-K. What is the Mechanism of Bonding of Metals During Welding or Soldering? (In German.) C. Keel. *Zeitschrift fur Schweisstechnik, Journal de la Soudure,* v. 41, Jan. 1951, p. 2-6; Feb. 1951, p. 30-35.

Attempts are made to answer the question on the basis of fundamental metallurgical principles. Micrographic study reveals typical differences characterizing various forms of bonds between metals. 18 ref. (K general)

243-K. Hard-Soldering in Mass Production. (In German.) Hugo Frostne.

Schweisstechnik, v. 5, Jan. 1951, p. 4-8. (From *AGA-Svetsning* (Stockholm), June 1948.)

Principles, processes, and equipment. Diagrams show recommended joint designs; also construction of equipment for production-line hard soldering. (K7)

244-K. Welding Malleable Iron. (In German.) F. Roll. *Giesserei,* v. 38 (new ser., v. 4), Feb. 22, 1951, p. 86-88.

Methods for welding white and black malleable iron and the possibility of machining the welded parts. Includes an outline of specifications. (K general, CI)

245-K. Welding Cast Iron Parts of Heating Boilers. (In German.) H. A. Horn. *Schweissen und Schneiden,* v. 3, Jan. 1951, p. 11-17.

Economy of the process, difficulties involved, procedure, and precautions to be taken to prevent weld cracking. (K general, T25, CI)

246-K. Application of the Ellira Welding Process in Machine Construction. (In German.) Th. Hövel. *Schweissen und Schneiden,* v. 3, Jan. 1951, p. 17-21.

Equipment for submerged-melt welding process. Practical examples of how to make good welds in thick and thin steel plate. (K1, ST)

247-K. Smoke in Arc Welding. W. Hummitzsch. *Welding Journal,* v. 30, Apr. 1951, p. 323-324. (Translated and condensed from *Schweisstechnik,* v. 4, Nov. 1950, p. 121-130.

Data on gases evolved from electrode coatings. Compositions of smokes and slags from different types of electrodes. Refers to 1946 paper by Mallett and Rieppel. (K1)

248-K. Welding of High-Temperature, High-Pressure Piping. Louis C. McNutt. *Welding Journal,* v. 30, Apr. 1951, p. 325-330.

Fabrication and welding procedures successfully used on six groups of alloy-steel compositions for high-temperature service. Includes photomicrographs.
(K general, AY, SG-h)

249-K. Welding Aluminum Alloys. G. O. Hoglund. *Welding Journal,* v. 30, Apr. 1951, p. 331-346.

Fundamental and practical considerations, including properties, procedure, inspection, design, and applications. (K1, K2, K3, Al)

250-K. Applications of Welded Design for Cost Reduction. R. H. Bennewitz. *Welding Journal,* v. 30, Apr. 1951, p. 347-357.

Principles of good welding design including a statement of advantages of welding, selection of material, production requirements, equipment, joint design, fixtures, and costs.
(K general)

251-K. Making Lead Pipe Joints. L. S. Bowser. *Welding Journal,* v. 30, Apr. 1951, p. 362-363.

Torch welding procedures.
(K2, Pb)

252-K. Welded Reinforcement of Openings on Structural Steel Members. D. Vasarhelyi and R. A. Hechtman. *Welding Journal,* v. 30, Apr. 1951, p. 182s-192s.

Determination of the effectiveness of three types of arc welded reinforcement, face bars, single doubler plates, and insert plates, for circular, square-with-rounded-corners, and square-with-sharp-corner openings. (K1, T26, CN)

253-K. Evaluation of Welded Ship Plate by Direct Explosion Testing. G. S. Mikhalapov. *Welding Journal,* v. 30, Apr. 1951, p. 195s-201s.

Evaluation of relative notch sensitivity of two grades of ship plate when welded with several processes and procedures. (K9, Q23, CN)

254-K. Studwelding Slashes Fabrication Time. C. H. Creasser. *Iron Age,* v. 167, Apr. 12, 1951, p. 110-111.

How Combustion Engineering-Superheater, Inc., slashes assembly time for large powerplant equipment by use of end-welded studs. This method permits placing studs as fast as 5 per min. A unique aligning device aids accuracy and speed. (K1, ST)

255-K. Silver Alloy Brazing a Versatile Joining Method. A. Stanley Cross, Jr. *Materials & Methods,* v. 33, Apr. 1951, p. 82-85.

Recommendations for selection of the proper Ag brazing alloy and flux from among the many available; also correct design procedures. Information is correlated in tabular form. (K8, Ag, SG-f)

256-K. Hidden Arc Welding of High Pressure Piping. C. G. Herbruck. *Petroleum Engineer,* v. 23, Apr. 1951, p. D20, D22.

Procedures and equipment; advantages. (K1, ST)

257-K. Slip of Structural Steel Double-Lap Joints Assembled With High-Strength Bolts. Part I. Effect of Bolt Tension and Faying Area Upon Slip. D. R. Young and R. A. Hechtman. *Trend in Engineering at the University of Washington,* v. 3, Apr. 1951, p. 24-27, 32.

23 tests of plain carbon structural steel double-lap joints assembled with high-strength steel bolts. All joints were tested in tension. Relative movement, or slip, of the lap plates with respect to the center plate was measured at various increments of load. (K13, CN)

258-K. A Simple Method for Butt Welding Fine Wires. Maurice Spielman. *Review of Scientific Instruments,* v. 22, Mar. 1951, p. 216-217.

Simple method of butt welding fine thermocouple wires and of joining wires of different diameters. By this method, 40-gage Chromel and Alumel wires (0.0031 in. in diam.) can be successfully butt welded and also joined to 18-ga. wire (0.040 in. in diam.). In addition, 30-ga. Cu and constantan wires (0.0100 in. in diam.) can be easily welded. (K6, Cu, SG-a)

259-K. The Uses and Abuses of Arc-Welding Electrodes. I. C. Fitch. *Sheet Metal Industries,* v. 28, Apr. 1951, p. 361-365, 369.

Recommendations for storage of electrodes, working conditions, surface preparation of metals, welding current and heat, joint preparation, also for the welding process as applied to broad types of steels. (K1, ST)

260-K. Welding Large Pieces by the Thermit Process. (In German.) W. Ahlert. *Schweissen und Schneiden,* v. 3, Feb. 1951, p. 40-52.

Variations of the process as applied to various ferrous and nonferrous metals, chemistry and metallurgy of the process. Procedure, equipment, treatment of the weld, its appearance, and properties. (K4)

261-K. Advances in the Field of Welding and Cutting; Recent Publications on Soldering. (In German.) *Schweissen und Schneiden,* v. 3, Feb. 1951, p. 63-64.

62 references. (K7)

262-K. Evaluation of Strength of Spot Welds According to Their Appearance. (In Russian.) E. A. Greil. *Avtogennoe Delo* (Welding), v. 21, Dec. 1950, p. 10-13.

Method developed for estimating strength of spot welds in sheet steel made from both sides, using two sizes of electrodes. It was found that diameter of the zone of irridescence may serve as the quality index, washout-out or non-circular irridescent zones indicating incorrect heat release during welding. (K9, K3, CN)

263-K. Welding of the Aluminum-Magnesium Alloy AMG-5. (In Russian.) A. V. Mordvintseva. *Avtogennoe Delo* (Welding), v. 21, Dec. 1950, p. 13-16.

Feasibility of welding Al alloy sheet containing 4.25-4.5% Mg, 0.48% Mn, 0.26% Si, and 0.34-0.37% Fe by argon-arc or gas welding or by arc welding using a metallic electrode. Complete applicability of these two methods. Mechanical properties of welds obtained. (K1, K2, Al)

264-K. Mechanism of Fusion of Weld-Deposited Metal. (In Russian.) V. A. Lapidus. *Avtogennoe Delo* (Welding), v. 21, Dec. 1950, p. 16-20.

Fusion of coated electrodes for welding of steel and chemical and physical processes involved in formation of molten droplets on the ends of the electrodes, their detachment, and union with the base metal were investigated photographically and analytically. Method of investigation and results. (K1, ST)

265-K. Nitro Sphere Design Solves Unique Fabrication Problem. John A. Toland. *Western Metals,* v. 9, Apr. 1951, p. 30-31.

Arc-weld fabrication of stainless steel spherical tank for liquid nitrogen storage. (K1, T26, SS)

266-K. Welding at the St. George. Jack Medoff. *Welding Engineer,* v. 36, Apr. 1951, p. 17-20.

Maintenance welding at Hotel St. George, Brooklyn. Principal materials are plain carbon and stainless steel, and monel. (K general, CN, SS, T26, Ni)

267-K. Spot Brazing Chair Frames. *Welding Engineer,* v. 36, Apr. 1951, p. 21.

Arnolt Corp. ships Cr-plated dinette and card-table chairs knocked down. Local distributors use spot brazing for assembly. (K8, CN)

268-K. In Italy It's Vierendeel. A. Bozzarelli. *Welding Engineer,* v. 36, Apr. 1951, p. 22-25.

Vierendeel truss design is said to offer other advantages such as better corrosion resistance and lowered maintenance. Weld fabrication and erection. (K general, T26, CN)

269-K. How We Repair Steel Castings. Alfred E. Blake, Jr. *Welding Engineer,* v. 36, Apr. 1951, p. 26-29, 33.

Use of semi-automatic, submerged-arc welding for repair of high-temperature, high-pressure steel castings produced at the Everett steel foundry of General Electric Co. (K1, CI, SG-h)

270-K. Stainless-Steel Towers for Scottish Oil Refinery. E. N. Zimmerman. *Welding Engineer,* v. 36, Apr. 1951, p. 34-35, 39.

Arc-weld fabrication by Chicago Bridge & Iron Co. at its Birmingham, Ala., plant. (K1, T26, SS)

271-K. Even on One-Time Jobs Mechanization Cuts Costs. H. Jackson. *Welding Engineer,* v. 36, Apr. 1951, p. 36-39.

Use of grit blasting to clean plate edges, vacuum recovery and separation of flux, and automatic or

semi-automatic submerged-arc welding instead of manual welding at Thompson Pipe and Steel Co., Denver. (K1, ST)

272-K. Stainless Welded Without Columbium. Richard K. Lee. *Welding Engineer,* v. 36, Apr. 1951, p, 40-42.

See abstract under similar title from *Machinery* (American), item 185-K, 1951. (K1, SS)

273-K. Studies of Ceramic Fluxes for Welding Steel—The Role of Fluorine. Willi M. Conn. *Ceramic Age,* v. 57, Apr. 1951, p. 38-40.

A survey of research which led to the development of ceramic fluxes based on mullite, to be used in welding steel. It is shown that the presence of a halide—for example, fluorine—is essential in welding fluxes for controlling the viscosities of the molten metal and flux, and for the production of excellent welds. The influence of moisture on the loss of F from a ceramic batch. Production methods for ceramic fluxes, based on results of the tests. 10 ref. (K1, ST, EG-k)

274-K. Steel Radiator Production. *Welding & Metal Fabrication,* v. 19, Apr. 1951, p. 122-128.

Equipment and procedures of British firm. Presswork, automatic gas welding, and spot welding are the principal procedures. (K2. K3, G1, CN)

275-K. Productivity and Welding. H. West. *Welding & Metal Fabrication,* v. 19, Apr. 1951, p. 129-132.

Application of various welding processes in order to improve productivity. (K general)

276-K. Argon-Arc Welding Light Alloy Pipe and Tubes. C. Lewis Bailton. *Welding & Metal Fabrication,* v. 19, Apr. 1951, p. 149-151.

Practical development work on argon-arc welding of Al tubes. Successful results were obtained by the use of special procedure. Overhead and vertical welding was also achieved. (K1, Al)

277-K. Heat-Resistant Alloys. H. E. Lardge. *Aircraft Production,* v. 13, Mar. 1951, p. 84-87; Apr. 1951, p. 121-123.

Application of welding processes to sheet materials for gas turbines. Mild steel, austenitic 18-8 steel, Inconel, 80-20 Ni-Cr, and a 23-12-3-1 Cr-Ni-W-Si alloy were investigated. Part I: fusion welding, torch welding, carbon-arc, argon-arc, metallic-arc, resistance, and spot welding. Second installment: other forms of resistance-welding and the electrical hot-riveting process. Micrographs and macrographs illustrate structures obtained. 20 ref. (K general, CN, SS, Ni, SG-h)

278-K. Metal-Bonding. F. H. Parker. *Aircraft Production,* v. 13, Apr. 1951, p. 107-114.

Development work on metal adhesive processes by the Bristol Aeroplane Co., Ltd., with emphasis on use of the Redux process on Al alloys. (K12, Al)

279-K. Reports of International Welding Commissions. *Transactions of the Institute of Welding,* v. 14, Feb. 1951, p. 5-12.

Reports of 5 Commissions presented at June 1950 meeting: gas welding and allied processes; arc welding; control, testing, and measuring of welds; hygiene and safety; and fatigue testing procedures and equipment for welds. (K general)

280-K. Welded Bridges and Hangars in Spain. E. Torroja. *Transactions of the Institute of Welding,* v. 14, Feb. 1951, p. 13-21; disc. p. 22-23. (K general, T26, CN)

281-K. The Industrial Use of Flash Welding, Dealing in Particular With Ferrous Materials. *Welding Research,* v. 5, Feb. 1951, (bound with *Transactions of the Institute of Welding,* v. 14), p. 135r-146r.

A guide for industrial users of the process, in connection with the welding of ferrous materials. The process can also be applied to some nonferrous metals, including Al alloys. (K3, Fe, ST, Al)

282-K. Hard Soldering Aluminum and Its Alloys. (In French and German.) E. Zurbrügg. *Aluminium Suisse,* Mar. 1951, p. 52-61.

Differences between welding, hard soldering, and soft soldering. Procedures, equipment, solder and flux compositions, applications, and properties. (K7, Al)

283-K. Spherical Pressure Tank Welded From Stainless Plate. *Metal Progress,* v. 59, Apr. 1951, p. 516-517.

Arc weld fabrication and use of an "exploded" cube design. (K1, T26, SS)

284-K. Effect of Repeated Machine Welding. *Metal Progress,* v. 59, Apr. 1951, p. 562, 564. (Condensed from "Effect of Repeated Welding on the Physical and Metallurgical Properties of A-212 Plate"; *Babcock and Wilcox Co.,* Report 3363; *U. S. Atomic Energy Commission,* NP-1700.)

Effects of submerged-arc welding on microstructures and mechanical properties. No detrimental effects were observed. (K1, CN)

285-K. Pressure-Welded Copper Alloys. *Metal Progress,* v. 59, Apr. 1951, p. 544, 546. (Condensed from "The Pressure-Welding Characteristics of

Some Copper-Base Alloys", Edwin Davis and Eric Holmes.

Previously abstracted from *Journal of the Institute of Metals.* See item 393-K, 1950. (K2, Cu)

286-K. Metal-to-Glass Seal. *Metal Progress,* v. 59, Apr. 1951, p. 556, 558, 560. (Condensed from "A Nickel-Chromium-Iron Alloy for Sealing to Glass", J. E. Stanworth.)

Previously abstracted from *Journal of Scientific Instruments.* See item 686-K, 1950. (K11, T1, Ni, Fe)

287-K. Welding of Armor. *Metal Progress,* v. 59, Apr. 1951, p. 580, 582. (Condensed from "Developments in the Welding of Armor", T. L. H. Butterfield.)

Previously abstracted from *Welder.* See item 22-562, 1947. (K1, T2, CN)

288-K. Aluminum Boxes Inert-Arc Welded. *Iron Age,* v. 167, May 3, 1951, p. 99.

Technique developed at Federal Telephone and Radio Corp., Clifton, N. J. The boxes are mass-produced in three different styles for enclosing military communications equipment. (K1, Al)

289-K. Liquefied Nitrogen Storage Vessel Fabricated by Welding. Bartlett West. *Modern Machine Shop,* v. 23, May 1951, p. 198-200, 202.

Fabrication of spherical vessel from stainless steel plate, 3 11/16 in. thick, using Heliarc welding. (K1, SS)

290-K. Modern Equipment at Work. Jet Engine Rings Fabricated From Titanium Bar Stock. *Modern Machine Shop,* v. 23, May 1951, p. 214.

Rings for aircraft jet-engine components are successfully flash-butt welded from titanium stock having a cross-section area of 2 sq. in. at American Welding & Mfg. Co., Warren, Ohio. (K3, Ti)

291-K. Center Studs Brazed to Brass Candy Dishes With Induction Heating Equipment. *Modern Machine Shop,* v. 23, May 1951, p. 218, 220. (K8, Cu)

292-K. Welded Differential Housing 20 Per Cent Lighter. R. R. Kilgore. *Steel,* v. 128, May 7, 1951, p. 121.

How 20% weight reduction, maintaining maximum rigidity, resulted from redesigning the rear-axle differential housing of large self-propelled earth movers for welded fabrication. (K1, T7, CN)

293-K. How Ore Cars Were Reconditioned by Welding. *Railway Mechanical and Electrical Engineer,* v. 125, May 1951, p. 65-69. (K general, T23, CN)

294-K. Reduce Weld Cleaning Costs. Bernard J. Smolka and Herbert Gefvert. *Industry & Welding,* v. 24, May 1951, p. 24-26.

Use of antispatter compounds. Material welded is mild-steel plate. (K1, CN)

295-K. All Welded Barges for the Army Transportation Corps. Lloyd F. Green. *Industry & Welding,* v. 24, May 1951, p. 28-30. (K general, T22, CN)

296-K. New Resistance Welding Technique. Clarence Broner. *Industry & Welding,* v. 24, May 1951, p. 42.

Relatively new process uses either a seam or projection-type welder to obtain a clean, smooth end-to-end joint without metal overlap or protruding metal on joined edges of the sheets. (K3)

297-K. Repair and Conversion of Heavy Freighters. J. W. Massenburg and Charles Hutchinson. *Industry & Welding,* v. 24, May 1951, p. 44-46, 48.

Use of automatic submerged-arc welding. (K1, T22, CN)

298-K. Explosion Test Used in Weld Studies. W. S. Pellini and C. E. Hartbower. *Iron Age,* v. 167, May 10, 1951, p. 83-87.

Advantages of explosion bulge testing of welds under controlled biaxial stress conditions. Various types of welds in steel plate were tested with both circular and ellipsoidal bulges. Concepts of weld-deformation mechanics deduced from the bulge studies were found to be general to weld performance, not specific to high rates of loading. (K9, CN)

299-K. Ceco Builds Bailey Bridges. Clyde B. Clason. *Welding Engineer,* v. 36, May 1951, p. 21-25.

Welding equipment and procedures of Ceco Steel Products Corp., Chicago. (K1, T26, CN)

300-K. 15-Ton Aluminum Crane Inert-Arc Welded. W. F. Walker. *Welding Engineer,* v. 36, May 1951, p. 26-27, 31.

Equipment and procedures. (K1, T5, Al)

301-K. Welding Aids Truck Body Manufacture. Fred M. Burt. *Welding Engineer,* v. 36, May 1951, p. 28-31.

Gas and arc welding equipment and procedures of Advance Auto Body Works, Los Angeles. (K1, K2, T21, CN)

302-K. Internal Clamp for Pipe Welding. William R. Harper. *Welding Engineer,* v. 36, May 1951, p. 32-33, 56.

Clamp helps cut down electrode waste and welding time in field welding of oil pipeline. (K1, CN)

303-K. Welding for Window Dressing. W. C. Henzlik. *Welding Engineer,* v. 36, May 1951, p. 35-37, 42.

Procedure for creating fancy window displays and racks from steel wire using gas and resistance welding. (K2, K3, CN)

304-K. Field-Welded Digesters for the Columbia Cellulose Company. P. E. Savage. *Engineering Journal,* v. 34, Apr. 1951, p. 286-294.

History, preliminary planning, choice of electrodes and joints, radiographic inspection, shop fabrication, field assembly and welding, and stress relief. (K1, T29, CN)

305-K. Adhesion of Polyethylene and Polystyrene to Steel. Gerard Kraus and James E. Manson. *Journal of Polymer Science,* v. 6, May 1951, p. 625-631.

In polymer-metal adhesion, London dispersion forces alone contribute overwhelmingly to the total specific adhesion, and effective adhesion is not necessarily related to specific adhesion. (K11, ST)

306-K. Welding in Ship Construction. K. M. Lawson. *Australasian Engineer,* v. 44, Jan. 8, 1951, p. 44-54; disc., p. 54-55.

Changes necessitated by a changeover from riveted to welded construction in the shipyard. Equipment and procedures. (K1, T21, CN)

307-K. The Fabrication of Steel Keelplate. S. M. Algar. *Welder,* v. 19, Oct.-Dec. 1950, p. 80-82.

Use of arc welding by a British firm. (K1, T22, CN)

308-K. Making Rear Axle Casings for the Ford Consul and Zephyr Cars. *Machinery* (London), v. 78, Apr. 19, 1951, p. 627-638.

Arc welding and machining equipment, showing various stages in manufacture. (K1, G17, T21, CN)

309-K. Autogeneous Rail Welding. (In German.) J. Kunz and W. Raabe. *Schweissen und Schneiden,* v. 3, Mar. 1951, p. 73-83.

Effect of production methods and steel compositions on weldability of rails; mechanical properties and testing of rail welds; preparation of weld joints; and welding procedures. 13 ref. (K9, T23, CN)

310-K. Advances in the Field of Welding and Cutting. (In German.) *Schweissen und Schneiden,* v. 3, Mar. 1951, p. 91-96.

Brief discussion precedes a bibliography of 164 ref. (K general, G22)

311-K. Soldering With the Aid of High-Frequency Heat. (In French and German.) A. Leemann. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 41, Mar. 1951, p. 46-48; Apr. 1951, p. 63-70.

Principles and advantages. (K7)

312-K. Welding Sews up a Cost Problem. Charles G. Herbruck. *American Machinist,* v. 95, May 14, 1951, p. 142.

How Baltimore Broom Machine Co. converted from casting to weldments on their automatic broom-sewing machine, with a cost cut of 36%. (K1, T5, ST)

313-K. Welding High Yield Pipe. Carl J. Coulter. *Petroleum Engineer,* v. 23, May 1951, p. D52, D54.

Use of high-tensile strength steel in line pipe is an important economic factor. Results of welding thin-walled pipe. (K general, CN)

314-K. New Welding Methods for Tough Jobs. *Product Engineering,* v. 22, May 1951, p. 124-125.

Survey of several new arc, spot, and cold welding processes. (K1, K3, K5)

315-K. Welded Fasteners for Roofing and Siding. *Railway Engineering and Maintenance,* v. 47, May 1951, p. 456-458.

Relatively new way of applying roofing and siding materials, by which building contractors are reported to be effecting savings of 25-60% as compared with older methods. (K1, T26, CN)

316-K. Cast Weld Construction. Jack Osborn Felt. *Welding Journal,* v. 30, May 1951, p. 415-423.

Various examples of this type of construction. Show how gains can often be achieved by redesign for its use. Steel castings are joined by welding to produce finished products or parts. Largely of a summary of papers presented at the 5th Annual Technical and Operating Conference, Steel Founders' Society of America. (K general, E general, CI)

317-K. Arc Welding Stainless Steel Without Columbium. Richard K. Lee. *Welding Journal,* v. 30, May 1951, p. 447-449.

Previously abstracted from *Machinery* (American). See item 185-K, 1951. (K1, SS)

318-K. Design Data for Brazing. Part I. W. J. Van Natten. *Welding Journal,* v. 30, May 1951, p. 452-454.

Recommended by the Welding Section of the Schenectady Works Laboratory of General Electric Co. (To be continued.) (K8)

319-K. Construction of Fishing Trawler. William A. Palmer. *Welding Journal,* v. 30, May 1951, p. 454-455.

Techniques for flame cutting and arc welding. (K1, G22, T22, CN)

320-K. Silver Brazing Used on Billion-Volt Machine. E. W. Moles. *Welding Journal,* v. 30, 1951, p. 456-457.

Use in joining parts of the copper coil of the 2-3 billion electron-volt cosmotron at the Brookhaven National Lab. (K8, CN)

321-K. Aluminum Boxes Welded. *Welding Journal,* v. 30, May 1951, p. 460.

New method of machine-welding (Heliarc method) large quantities of rectangular Al boxes, used to enclose various types of communications equipment for the Signal Corps and other branches of the Armed Services. (K1, Al)

322-K. A Welded Aircraft Hangar. O. Bordsgaard. *Welding Journal,* v. 30, May 1951, p. 461-462. (Translated and condensed from *l'Ossature Métallique,* v. 15, Dec. 1950, p. 589-594.)

Welded design of a Danish structure. (K1, T26, CN)

323-K. Physical and Welding Metallurgy of Chromium Stainless Steel. Helmut Thielsch. *Welding Journal,* v. 30, May 1951, p. 209s-250s.

Reviews published and unpublished information on martensitic and ferritic stainless steels with emphasis on their physical and welding metallurgy. Brittleness, sigma-phase embrittlement, high-temperature embrittlement, notch-sensitivity, and effects of various alloying elements were studied. 213 ref. (K9, Q23, SS)

324-K. Measuring the Tungsten Consumption in Inert Gas Arc Welding. G. Urbain. *Welding Journal,* v. 30, May 1951, p. 260s-264s.

Use of the radioactive tracer technique using W^{187} to measure W losses in plate and weld metal, also fumes in inert-gas arc welding of 18-8 stainless steel. (K1, S19, SS)

325-K. Static and Fatigue Tests on Spot-Welded Trusses. Artemy S. Joukoff. *Welding Journal,* v. 30, May 1951, p. 264s-265s. (Translated and condensed.)

Previously abstracted from *Revue de la Soudure.* See item 20-K, 1951. (K9, K3, Q28, Q7, CN)

326-K. Rubber-to-Metal Bonding. *Aircraft Production,* v. 13, May 1951, p. 131-132.

Adaptation of the Redux process to the bonding of rubber to metal for sealing-strips on the engine-bay doors of the de Havilland Comet. (K11)

327-K. The Welding of Light Alloys; Effects of Variations of Metal Composition on Contraction Cracks. (In French.) M. Hollard. *Soudure et Techniques Connexes,* v. 4, Nov.-Dec. 1950, p. 240-247.

Study of crack formation in welds in light alloys. Crack curves were plotted for "Duralinox" for variable Mg contents and fixed proportions of Fe, Si, and Mn. Certain types of "Duralinox" and "Almasilium" showed no cracks. Certain types of Duraluminum showed only a limited tendency toward crack formation. 11 ref. (K9, Al)

328-K. Set Up Steel Casting Welding Standards and Procedures. John D. Wozny. *American Foundryman,* v. 19, May 1951, p. 72-79.

Establishment of welding standards at American Steel Foundries, East Chicago, Ind., on the basis of results of investigation of plain-carbon (Grade B), intermediate (1.60%) Mn, and SAE 1040 steels. (K general, CI)

329-K. How to Save 30% on Steel. *Architectural Forum; The Magazine of Building,* v. 94, May 1951, p. 113, 234.

Van Rensselaer P. Saxe, Baltimore structural engineer, comments on recommendations that welding plus higher stresses offers a far better way to meet the shortage of structural steel than threatened cuts in construction. Shows that not 10%, but 30% of all the steel now used in a typical riveted steel-frame commercial building could be saved by a judicious combination of higher allowable stresses, field welding, and rigid frame design. (K general, T26, CN)

330-K. Manipulator Carries Automatic Welding Head. H. E. Hodges. *Iron Age,* v. 167, May 24, 1951, p. 93-94.

Development and operation of automatic welding at Continental Foundry and Machine Co., Chicago. (K1)

331-K. Notch-Coil Brazing Rings Boost Production. *Iron Age,* v. 167, May 24, 1951, p. 102.

Brazing output of electrical transformer connectors was raised 62% over previously used machine-wound individual rings. Other advantages. (K8)

332-K. What You Can Do With Submerged Arc Welding. C. A. Heffernon. *Materials & Methods,* v. 33, May 1951, p. 82-85.

Unionmelt welding produced high-quality welds at high speeds in most of the commercially used ferrous and nonferrous metals, with the exception of Mg and Al. (K1)

333-K. Riveting Aluminum: Types of Rivets, Joints, Equipment; How to Use Them; Special Practices. F. F. Dietsch. *Modern Metals,* v. 7, May 1951, p. 40-45.

Details, clarified by diagrams. (K13, Al)

334-K. Unique Pressure Vessel Produced. *Steel Processing,* v. 37, May 1951, p. 237, 250.

Production of welded stainless-steel spherical storage chamber by multiple-pass arc welding. (K1, T26, SS)

335-K. The Design of Welds. A. G. Thompson and F. Brooksbank. *Welding & Metal Fabrication,* v. 19, Apr. 1951, p. 140-144; May 1951, p. 184-191.

Recommendations clarified by diagrams, photographs, and numerical examples. 14 ref. (K general)

336-K. Resistance Welding of Cross-Wire Joints. R. Bushell. *Welding & Metal Fabrication,* v. 19, May 1951, p. 175-178.

Process applied to manufacture of miscellaneous articles such as bird cages, milkbottle containers, refrigerator shelving, etc. It can be applied to low-carbon mild steel wire, brass, stainless steel, copper-coated mild steel, and galvanized steel wire. However, mild steel wire, either plain, bright, galvanized, or copper-coated, is in greatest demand. (K3, CN, Cu, SS)

337-K. Assembly Line for Welded Car Frames. *Western Metals,* v. 9, May 1951, p. 34-35.

Assembly of freight-car frames at two Los Angeles plants of Consolidated Western Steel Corp. (K1, T23, CN)

338-K. The Status of Light-Metal Resistance Seam Welding. F. Gerspacher. *Brown Boveri Review,* v. 37, Aug.-Sept. 1950, p. 281-288.

Electrical and mechanical designs; correct roller contour; correct overlap; appearance; tests and results on separation, micrography, tensile strength, pressure, and X-ray. Recommended weldable Al alloys and results of experimental welds. (K3. Al)

339-K. The Weldability of High-Strength Structural Steel. (In Italian.) Alberto Nacher. *Metallurgia Italiana,* v. 42, Dec. 1950, p. 456-472.

Influence of factors such as composition, heat treatment, rate of cooling, etc., on sensitivity and local brittleness of the welds. A new weldability test is proposed, based on hardness determination. (K9, CN)

340-K. Engineering "Know How" Combines With Resistance Welding to Provide Increased Production. *Industry & Welding,* v. 24, June 1951, p. 25-27.

Use in production of Maytag washers. (K3, CN)

341-K. Here's How to Rebuild Worn Equipment. *Industry & Welding,* v. 24, June 1951, p. 28, 90.

Use of automatic submerged-arc welding machines to restore heavy equipment, such as tractor rollers. (K1, CN)

342-K. Stud Welding Reduces Costs in the Construction Field. *Industry & Welding,* v. 24, June 1951, p. 33-34.

Use in rapid erection of two hangars for Northwest Airlines in Minneapolis. (K1, CN)

343-K. Welded Rail Costs 30% Less. Bernard J. Smolka and Herbert Gefvert. *Industry & Welding,* v. 24, June 1951, p. 36, 94.

Fabricated slide rail which replaces original cast-iron design at Reliance Electric & Engineering Co., with cost saving of almost 30% and 60% in weight. (K1, CN)

344-K. Inert-Arc Raises Aluminum Frame Production by 70%. *Industry & Welding,* v. 24, June 1951, p. 46

Procedures and equipment of ABC Steel Equipment Co., Tampa, Fla. (K1, Al)

345-K. High-Strength Pressure Vessel of Welded Stainless Steel. *Machinery* (American), v. 57, June 1951, p. 187.

Arc weld construction of spherical vessel for liquid N_2 at $-340°$ F. (K1, SS)

346-K. How to Use Low-Melting Filler Metals in Die Construction and Repair. R. H. Groman. *Magazine of Tooling and Production,* v. 17, June 1951, p. 52-53, 72, 76, 80, 143, 145, 147.

Weld-repair procedure. Both electric-arc and torch welding are used. (K1, K2, TS)

347-K. Cost of Welding Stabilized Stainless. David W. McDowell, Jr. *Metal Progress,* v. 59, May 1951, p. 650-652.

Welding tests were made and costs evaluated for both Type 321 and 347 stabilized stainless sheet. Inert-arc and metallic-arc welding processes were used. The results indicate that more satisfactory and more economical weldments can be made from Type 321 than from Type 347 sheet. (K1, SS)

348-K. Bonding of Titanium Carbide With Metal. Walter J. Engel. *Metal Progress,* v. 59, May 1951, p. 664-667.

Previously abstracted under similar title appearing in National Advisory Committee for Aeronautics, Technical Note 2187, Sept. 1950. See item 629-K, 1950. (K5, M27, Ti, C-n)

349-K. Welding Air Hardening Steels. *Metal Progress,* v. 59, May 1951, p. 698, 700, 702, 704, 706. (Condensed from "Welding Air-Hardening Alloy Steels," Walter H. Wooding.)

Previously abstracted from *Welding Journal.* See item 681-K, 1951. (K1, K9, N8, AY)

350-K. Stringer Beads Run By Four Welders. Shannon L. Pound. *Oil and Gas Journal,* v. 50, May 31, 1951, pt. 1, p. 110.

Technique used by Western Pipe Line Constructors, Inc. Satisfactory results were obtained by avoiding difficulties which have baffled previous attempts to use four instead of the customary two stringer-bead welders. (K1, CN)

351-K. Arc Welding of Stainless Steel. M. N. Vuchnick. *Canadian Metals,* v. 14, May 1951, p. 34-35, 38, 41-42.

Recommended procedures. (K1, SS)

352-K. Influence of Length of a Butt Weld on Its Transverse Contraction. (In French.) F. Campus. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Feb. 26, 1951, p. 792-794.

Earlier research established that contraction is dependent on increase of length. Thorough experimental investigation showed that this dependence is logarithmic. Method of investigation, results and their practical applications. (K general)

353-K. An Improved Two-Flame Welding Method. (In German.) K. Krekeler and H. Kunz. *Schweissen und Schneiden,* v. 3, May 1951, p. 142-147.

Equipment and procedures. Comparative test data on quality, efficiency, and economy of single-torch and double-torch welding of steel. (K2, ST)

354-K. Welding the Tunnel Reinforcement for the High-Pressure Duct of a Hydroelectric Power Plant. (In German.) R. Malisius and W. Liebig. *Schweissen und Schneiden,* v. 3, Apr. 1951, p. 103-107.

Plans, designs, preparation, and procedure for welding a duct (6 meters in diam. and made of 14-mm. sheet steel) passing through a tunnel. The welds were X-rayed for possible defects. Includes a cost analysis of Unionmelt welding and of electric-arc welding. (K1, CN)

355-K. The Weight of Seam Welds in Steel. (In German.) H. v. Neuenkirchen. *Schweissen und Schneiden,* v. 3, Apr. 1951, p. 108-110.

A method of computing the above. (K3, ST)

356-K. Welding With Argon as Protecting Gas. (In German.) H. Bühler and W. Günther. *Schweissen und Schneiden,* v. 3, Apr. 1951, p. 110-112.

Review of literature. Development of the Argon-arc and Aircomatic processes. 37 ref. (K1)

357-K. Strength Investigation of One-Sided Fillet-Seam Welds of Different Shapes. (In German.) H. Dienst. *Schweissen und Schneiden,* v. 3, Apr. 1951, p. 112-114.

Tensile strength of one-sided fillet-seam in steel hardly ever exceeds 40% of that of the welded material. Desirable weld designs. (K1, Q27, ST)

358-K. Heavy Plate Spot Welding With Multiple-Current Impulse Control. (In German.) F. Rosenberg. *Schweissen und Schneiden,* v. 3, Apr. 1951, p. 115-116.

Interrupted current flow permits cooling of the surface of heavy steel or Al plate and the accumulation of heat at the point of welding, thus preventing structural changes, internal stresses, and deformation as the results of excessive heating. (K3, ST, Al)

359-K. Advances in the Field of Welding and Cutting. Important Recent Publications on Welding Methods and Economics. (In German.) *Schweissen und Schneiden,* v. 3, May 1951, p. 150-155.

143 references. (K general, G22)

360-K. Possibilities of a Basic Coating on Special-Purpose Electrodes. (In Italian.) Italo Fiorini. *Metallurgia Italiana,* v. 43, Feb. 1951, p. 65-71.

After a general survey of the various types of coatings available for welding electrodes for ferrous materials, the origin and development of the basic electrode is described. Results of tests on high-creep-limit weld-metal deposits and with heat and wear resistant weld metals. (K1, Fe, ST)

361-K. Welded Frame Allows Re-Use of Century-Old Building. E. E. Goehringer. *Engineering News-Record,* v. 146, June 14, 1951, p. 37.

Conversion of a 100-year-old grain elevator into a five-story warehouse at a total cost of $1.85 per sq. ft., using standard shapes and lengths. (K1, T26, CN)

362-K. The Physical Aspect of Glass-Metal Sealability in the Electronic Tube Industry. Georges Trebuchon and Jacques Kieffer. *Glass Industry,* v. 32, Apr. 1951, p. 165-174, 192, 194, 196, 200, 202; May 1951, p. 240-247, 254-255; June 1951, p. 290-295. (Translated from *Verres et Réfractaires.*)

Previously abstracted from original. See item 173-K, 1951. (K11)

363-K. Oxy-Argon Gas Speeds Up Welding. *Iron Age,* v. 167, June 14, 1951, p. 85.

New process said to multiply the speed of inert-gas shielded-arc welding of stainless and carbon steels announced by Linde Air Products Co. Unusual results are obtained by use of a mixture of O_2 in argon as a shielding atmosphere. (K1, SS, CN)

364-K. Duplex Setup Solders Type to Typewriter Bars. Herbert Chase. *Steel,* v. 128, June 18, 1951, p. 76.

Double-flame arrangement for heating which guarantees precise fastening of type characters to each of 42 bars. Alignment after soldering is checked by comparator. (K7)

365-K. More Welding at Fort Peck. T. B. Jefferson. *Welding Engineer,* v. 36, June 1951, p. 17-19, 31.

Fabrication of a 65-ton riser tee

to connect a penstock with the surge tower at Fort Peck dam. (K1, T26, CN)

366-K. First All-Welded Bessemer Converters. H. L. McFeaters. *Welding Engineer,* v. 36, June 1951, p. 20-21.

How four 25-ton converters were fabricated for National Tube Co. Lighter, cleaner, and more streamlined equipment resulted from changing to welded construction. (K1, T5, CN)

367-K. Canada's Welded Passenger Cars. Hugh G. Jarman. *Welding Engineer,* v. 36, June 1951, p. 26-27.

Production for Canadian National Railways, using submerged-arc welding. (K1, T23, CN)

368-K. Welded Towers for Television. Robert A. Hunerwadel. *Welding Engineer,* v. 36, June 1951, p. 35.

Towers made for rural reception by a small company in Chattanooga. (K general, T1, CN)

369-K. 47% Saving. Charles G. Herbruck. *Welding Engineer,* v. 36. June 1951, p. 36-37.

How good design in changing the base of a radial drill and arm router from cast iron to welded steel has reduced manufacturing costs 47% for Onsrud Machine Works, Chicago. (K general, T5, CN)

370-K. De Havilland Comet: Planning and Production Methods. Part I. Design and Production Liaison; Fuselage Tooling and Construction. Part II. Construction and Tooling of the Wing; Plaster Models; Glass-Cloth Moulding. H. Povey. *Aircraft Production,* v. 13, May 1951, p. 134-141; June 1951, p. 170-178.

Various phases including Redux bonding of metals to nonmetals, riveting, etc. (K11, K13)

371-K. Assembly by Brazing. H. R. Brooker. *Metal Industry,* v. 78, May 25, 1951, p. 426.

British standard which assists process control. (K8)

372-K. The Work of the Welding Engineer, P. L. Pocock. *Metallurgia,* v. 43, May 1951, p. 249-252.

An illustrated survey. (K general)

373-K. Automatic or Hand Welding? (In German.) Hermann Stern. *Schweisstechnik,* v. 5, Mar. 1951, p. 25-30.

Compares automatic and hand methods of arc welding from the standpoints of quality and economy. (To be continued.) (K1)

374-K. Copper and Copper Alloys as Addition Materials for Welding and Soldering. (In German.) Benno Sixt. *Schweisstechnik,* v. 5, Mar. 1951, p. 30-34.

Experimental results with Cu, Cu-Zn, Cu-Sn, and Cu-Al welding rods. Photographs, charts, and tables are presented. (To be continued.) (K1, K7, T5, Cu)

375-K. Application of Carbon-Containing Ferromanganese in the Coatings of High-Efficiency Electrodes. (In Russian) L. M. Yarovinskii and V. V. Bazhenov. *Avtogennoe Delo* (Welding), v. 22, Jan. 1951, p. 3-9.

Proposes replacement of low-carbon ferromanganese, produced in the electric furnace and used in the coating of welding electrodes, by less expensive blast-furnace ferromanganese. The first experiments on such substitution resulted in pore formation in welds in steel. Experimental investigation clearly indicates causes of the pore formation and describes a method for its elimination. (K1, T5, ST)

376-K. Gas Formation and its Elimination in Electrode Coatings Containing Ferrosilicon. (In Russian.) A. N. Shashkov. *Avtogennoe Delo* (Welding), v. 22, Jan. 1951, p. 9-11.

The problem of gas formation during welding. Theoretical considerations, together with experimental investigation, resulted in development of a method for elimination of this troublesome phenomenon. (K1, T5)

377-K. Stainless Orange Peel Holds Nitrogen. *American Machinist,* v. 95, June 25, 1951, p. 129.

Welded sections of spherical tank for compressed-nitrogen storage are said to resemble peel of an orange. Stainless-steel plates are joined by heliarc welding. (K1, T26, SS)

378-K. Welding a 10-Story VA Hospital. R. A. Phelps. *Engineering News-Record,* v. 146, June 21, 1951, p. 32-35.

Cost data showing differences in various items between welded and riveted construction. Typical welded units. (K general, T26, CN)

379-K. Rotary Fixture Welds a Plowshare a Minute. *Iron Age,* v. 167, June 21, 1951, p. 98.

Use of an 8-place rotary fixture has increased production of welded plowshares by 10%. Plow consists of a die-cut gunnel and a forged share, which are welded together. The rotary fixture holds the parts of the plowshare in position and moves them under a Unionmelt welding head at 19.1 ipm. (K1, T3, CN)

380-K. The Magnesium Star. *Light Metals,* v. 14, June 1951, p. 293-298.

Fabrication procedures on four-pointed Mg star suspended over the main approach to the Festival of Britain. Main emphasis on adhesive joining of sandwich panels and on arc welding. (K1, K12, T9, Mg)

381-K. Defective Iron Castings Saved by Repair Welding. *Materials & Methods,* v. 33, June 1951, p. 86-88.

Procedures and applications. (K general, CI)

382-K. Welding Armored Vehicles. *Metal Progress,* v. 59, June 1951, p. 848, 850, 852. (Condensed from "Evolution of Welded Armored Fighting Vehicles", R. J. Fowler and L. F. Denaro.)

Previously abstracted from *Transactions of the Institute of Welding,* v. 9. See items 22-468 and 22-541, 1946. (K1, T2, CN)

383-K. Induction Soldering. *Sheet Metal Industries,* v. 28, June 1951, p. 566.

High-frequency heating used in soldering sink-type water heaters. (K7, Cu)

384-K. Continuous Welded Structures, Abbey Works, Port Talbot. W. S. Atkins. *Transactions of the Institute of Welding,* v. 14, Apr. 1951, p. 28-38; disc., p. 38-43.

Design and construction of a new steelworks in South Wales. (K1, T26, CN)

385-K. The Uses and Abuses of Arc-Welding Electrodes. I. C. Fitch. *Transactions of the Institute of Welding,* v. 14, Apr. 1951, p. 45-52; disc., p. 52.

Previously abstracted from *Sheet Metal Industries,* item 259-K, 1951, (K1, ST)

386-K. Heavy Fabrication at Chepstow. Rolt Hammond. *Welding & Metal Fabrication,* v. 19, May 1951, p. 160-166; June 1951, p. 210-212.

Weld fabrication of heavy equipment by a British firm. (K general, CN)

387-K. Production of Domestic Heating Equipment. *Welding & Metal Fabrication,* v. 19, June 1951, p. 198-201.

Welding and fabrication procedures. (K general, G general, CN)

388-K. Fabrication of Corrosion-Resistant Metals; The Importance of Metallurgical Control. J. F. Lancaster. *Welding & Metal Fabrication,* v. 19, June 1951, p. 202-209.

Major emphasis is on welding. (K general, SG-h)

389-K. Welding and Its Effect on the Corrosion Resistance of Stainless Steel. E. W. Hopper. *Welding Journal,* v. 30, June 1951, p. 503-507.

Welded stainless steel failures due to corrosion and methods of minimizing such failures. The use of water cooling is recommended. (K1, R1, SS)

390-K. Tungsten-Thoria Electrodes for Inert Arc Welding. N. A. Chapin, J. D. Cobine, and C. J. Gallagher. *Welding Journal,* v. 30, June 1951, p. 529-531.

Electrodes overcome the erratic transition of the arc from the high-frequency spark to the actual arc. Initiation of a tungsten arc under typical welding conditions in argon is shown in consecutive frames of a movie taken at 50 frames per sec. (K1, W, Th)

391-K. A Welded Factory Building In Italy. *Welding Journal,* v. 30, June 1951, p. 534-535.

Transverse and longitudinal sections of the building and details of the column and roof structure. (K26)

392-K. Braze-Welding Furnace and Boiler Sections. E. E. Cashen. *Welding Journal,* v. 30, June 1951, p. 544-545. (K8, CI)

393-K. Current Welding Research Problems. *Welding Journal,* v. 30, June 1951, p. 273s-282s.

Compilation made for university research workers listing current welding research problems and suggestions as to the needs of industry. (K9)

394-K. Explosion Bulge Test Studies of the Deformation of Weldments. Carl E. Hartbower and William S. Pellini. *Welding Journal,* v. 30, June 1951, p. 307s-318s.

Semiworks-scale testing of full welds in heavy plate under combined stress conditions such as prevail in structures and the significance of the findings in evaluation of weld performance. (K9, ST)

395-K. Flash Butt Welding of Steel. L. Sanderson. *British Steelmaker,* v. 17, Apr. 1951, p. 207-211; May 1951, p. 255-259; June 1951, p. 320-323.

Part I: How the process came to be adopted commercially and the component parts of a typical welding machine. Metallurgical aspects including hardness variations in different kinds of steel. Application of the process to manufacture of twist drills. Part II: Process, explaining the nature of the characteristic flashing action. Various uses of preheating as a preliminary to butt welding. The part played by mechanical pressure in the process. Part III: Importance of careful design, choice of suitable materials, correct alignment, and other factors. Advantages, and details of composition and care of the electrodes and jaws, and choice of equipment. Refers briefly to high-speed valve-controlled butt welding. (K3, ST)

396-K. Automatic Machines Weld 120 Steel Assemblies Hourly. Herbert Chase. *Industry & Welding,* v. 24, July 1951, p. 28, 30, 74.

Process used in production of Dynaflow transmissions by Buick Motor Div. Material is SAE 1008 hot rolled steel; submerged-arc welding is used. (K1, CN)

397-K. Quick Test Eliminates Defects in Brazing. *Industry & Welding,* v. 24, July 1951, p. 38, 66.

How impurities are detected in cupro-nickel alloys by heating coupons in a combustion-tube furnace. Good brazability is indicated by a bright surface. (K8, Cu)

398-K. Welded Design Features Stainless Steel Equipment for Armed Services. Arthur R. Hill. *Industry & Welding,* v. 24, July 1951, p. 40-41, 43-44, 73.

Shielded-arc welding of stainless steel dishwashers by Peters-Dalton, Inc., Detroit. (K1, SS)

399-K. Aluminum Tanks Welded in Unique Fixtures. T. E. Imholz. *Iron Age,* v. 168, July 5, 1951, p. 87-89.

Fixtures which facilitate arc welding of Al aircraft wingtip gas tanks at Republic Aviation. Both hand and automatic Heliarc welding methods are employed, with and without filler rods. (K1, Al)

400-K. Hints for Silver-Brazing of Stainless Steel. *Linde Tips and Oxu-Acetylene Tips,* v. 30, July 1951, p. 53-56.

(K8, SS)

401-K. Rail Joint Welding. A. E. Belton, V. D. Hanson, J. S. Gelston, and H. O. Zimmerman. *Mining Congress Journal,* v. 37, June 1951, p. 49-52.

A committee report describing several processes of rail welding for coal mine tracks, giving methods, costs, and service records. (K general, T23, CN)

402-K. High Strength Fastening. Gilbert C. Close. *Modern Machine Shop,* v. 24, July 1951, p. 102-106, 108, 110, 112, 114, 116-117.

Various methods of joining Al alloy structures to withstand stresses imposed by supersonic flight speeds. Confined entirely to use of rivets, lockbolts, and other mechanical fastening devices. (K13, Al)

403-K. A Timing Control for Small Spot Welders. M. H. Nichols. *Review of Scientific Instruments,* v. 22, June 1951, p. 372-373.

Circuit parameters and components. (K3)

404-K. Application of Electron-Diffraction to Bonding Problems. J. W. Malden. *Transactions of the Institution of the Rubber Industry,* v. 27, June 1951, p. 175-178.

Use of the electron-diffraction technique in eliminating a cause of failure in brass-to-rubber bonding. A tentative explanation of the mechanism of the bonding process is suggested. 12 ref. (K11, Cu)

405-K. 1950 Facts and Figures. *Welding Engineer,* v. 36, Mid-June 1951, p. 5-13, 16.

Statistical review of the welding industry. (K general, A4)

406-K. Die Welding by the Metal Arc. Arthur R. Butler. *Welding Engineer,* v. 36, June 1951, p. 28-30; July 1951, p. 32-35.

Recommended procedures. First installment: Factors influencing hardness. Concluding part: recommended procedures. (K1, TS)

407-K. Recent Advancement in Structural Welding. LaMotte Grover. *Western Machinery and Steel World,* v. 42, June 1951, p. 86-88, 94.

A review. (K general, T26, CN)

408-K. Copper Furnace Brazing's Place in Forming Aircraft Components. Howard Eubank and George F. Brown. *Western Metals,* v. 9, June 1951, p. 42-44.

Advantages of the process. Specimen components are illustrated. (K8)

409-K. Submerged Arc Unit Welds Pipe-Line on Right-of-Way. C. A. Renton. *World Oil,* v. 133, July 1, 1951, p. 211-212, 218.

New light, portable welding unit is mounted on a tractor and used to weld 26-in. pipe into 2, 3, and 4-joint sections. Tests proved the welds equal in quality to the longitudinal pipe welds made by the same process at the pipe mill. (K1, CN)

410-K. Welding Practice in Britain. C. G. Bainbridge. *Canadian Metals,* v. 14, June 1951, p. 34-36, 38, 46-47.

A progress report on the application of welding to ships, structural steel, and locomotive construction. (K general, T26, CN)

411-K. Influence of the Atmosphere and of Heat Treatment on the Electric Welding Process. (In French.) H. G. Geerlings. *Revue de la Soudure; Lastijdschrift,* v. 7, No. 1, 1951, p. 16-24.

Effect of method of production of steel and type of electrode (coated or uncoated) on amount of N_2 and O_2 absorbed by the weld; also influence of heat treatment immediately after welding. Optimum conditions of heat treatment. (K1, J general, ST)

412-K. Angle Welding in a Vertical Position. (In French.) M. Mouton. *Revue de la Soudure; Lastijdschrift,* v. 7, No. 1, 1951, p. 25-34.

A new economical method applicable to ST-52 structural steel, using FP heavily coated electrodes for

deep-penetration welding, MP acid-coated electrodes for medium-penetration welding, and Type 55 electrodes for standard welding. (K1, CN)

413-K. Study of a New Set-Up for Construction of Welded Street Car Rail Crossings and Branches. (In French.) G. Bélien. *Revue de la Soudure; Lastijdschrift,* v. 7, No. 1, 1951, p. 35-44.

Details of process. Results of experiments made to determine optimum operating conditions. (K general, T23, CN)

414-K. Application of Modern Theories of Tempering to a Particular Case of Flash Welding. (In French.) M. Dodero. *Soudure et Techniques Connexes,* v. 5, Jan.-Feb. 1951, p. 19-26.

Application of the principle of martempering to a welding machine, combining the effect of a flash and the passage of a current of convenient voltage between the poles of the machine. The heat emitted slows down the cooling and stops it at the temperature desired. The method was applied to a carbon steel saw. (K3, J26, CN)

415-K. Examples of Welded Construction of Machinery for Making Steel Plate. (In French.) G. Frehaut. *Soudure et Technique Connexes,* v. 5, Mar.-Apr. 1951, p. 67-74; disc., p. 74-76.

Various types of machines and advantages of welded construction. (K general, T5, CN)

416-K. A Modern Method for the Control of Spot-Welding Machines. (In French.) J. Negre. *Soudure et Technique Connexes,* v. 5, Mar.-Apr. 1951, p. 77-85; disc., p. 84-85.

Construction and functioning of electronic apparatus with emphasis on the "Chronotron". (K3)

417-K. Tight Sealing of Glass and Mica in a Vacuum. (In French.) J. Labeyrie and P. Léger. *Vide,* v. 6, Jan. 1951, p. 951-952.

Powdered enamel is used as the joining agent. This method can also be applied to joining mica to alloys having expansion coefficients of 85-110 x 10^{-7} (K11)

418-K. Influence of Conditions of Spot-Welding of Low-Carbon Steel on Structure of the Weld Metal. (In Russian.) S. K. Sliozberg. *Avtogennoe Delo* (Welding), v. 22, Feb. 1951, p. 7-9.

Studied for steels containing 0.15-0.20% C. In low-carbon steel, structure of the spot and zones of thermal influence (depending on conditions of welding) affect, to a large extent, mechanical properties of the spot welds. Formation of such structures under different conditions of welding. (K3, CN)

419-K. Welded Rigid Frames Span 224 Ft. for Coliseum With Large Unobstructed Arena. Ralph E. Coblentz. *Engineering News-Record,* v. 147, July 12, 1951, p. 28-32.

Allen County War Memorial Coliseum, now under construction near Fort Wayne, Ind. (K general, T26, CN)

420-K. Today's Welding Equipment. J. W. St. Andre. *Factory Management and Maintenance,* v. 109, July 1951, p. 84-89.

An illustrated review. (K general)

421-K. Stitch It Instead. Part I. A. G. Denne. *Iron Age,* v. 168, July 19, 1951, p. 97-100.

Use of metal stitching to replace riveting and other joining methods in products ranging from autos to appliances, aircraft to toys. Production has been increased up to 700% at a cost of 9-12c per 100 stitches. Shear and tensile strength is good. Stitching is easily done by unskilled operators. Equipment power requirements are low. (K13)

422-K. Accurate Timing Essential for Low-Capacity Spotwelding. *Iron Age,* v. 168, July 19, 1951, p. 101.

Two examples of low-capacity spotwelding jobs at Westinghouse Electric Corp.'s Lamp Div., Bloomfield, N. J., which show that accurate weld time pays off on small jobs. (K3)

423-K. Tips on Welding High-Temperature Materials. F. H. Stevenson. *Iron Age,* v. 168, July 19, 1951, p. 109-111.

In production of military rockets, Aerojet Engineering has learned a lot about brazing and welding of Ti, stainless steels, and the special high-temperature super-alloys. All fusion and resistance welding techniques are used, selection depending upon practical considerations. (K general, SG-h, Ti, SS)

424-K. Convair "Metlbonds" B-36 Bomber. Charles L. Hibert. *Machinery* (American), v. 57, July 1951, p. 158-163.

Equipment and procedures for adhesive-bonding process developed by Consolidated Vultee Corp. It is applicable to a wide variety of sheet materials. (K12)

425-K. Electric Eye Accurately Locates Work in Riveting Operations. H. L. Hubbard. *Machinery* (American), v. 57, July 1951, p. 192-195. (K13)

426-K. Welding Copper Alloys. E. Ryalls. *Metal Industry,* v. 78, June 29, 1951, p. 519-523.

Review of the weldability of the many varieties of alloys available. Each metal has to be dealt with separately, the requirements expect-

ed from the joint determining such factors as flame setting, the rod, and the flux to be used. In order to ascertain the correct welding conditions, experimental welding runs should be made on scrap metal. (K9, K2, Cu)

427-K. The Bonding of Metals. C. J. Moss. *Metallurgia,* v. 43, June 1951, p. 267-272.

Bonding by use of synthetic-resin adhesives. Properties, nature of adhesion, preliminary cleaning, etc. Emphasis is on the "Redux" and "Araldite" types. (K12)

428-K. Doing the Job Better With Tracer-Controlled Welding. *Production Engineering & Management,* v. 28, July 1951, p. 95-96.

Automatic machine for contour-welding of steel, integrated with other operations, is providing greater production economies at American Radiator & Standard Sanitary's plant in Elyria, Ohio. (K general, ST)

429-K. A Survey of Modern Theory on Welding and Weldability. (Continued.) D. Séférian. *Sheet Metal Industries,* v. 28, July 1951, p. 643-652, 657.

Covers Cu and its alloys, brasses, bronzes, Ni, Inconel, cupronickels, Ni-silvers, Zn and its alloys, Mg alloys, and Pb. (To be continued.) (K9, Cu, Ni, Zn, Mg, Pb)

430-K. Sigma Welding Applications Expand. H. E. Rockefeller. *Steel,* v. 129, July 16, 1951, p. 75-78.

The shielded inert-gas metal-arc process using consumable electrodes is currently being applied commercially to Al, stainless, Cu, and Cu alloys and even to carbon steel. Small amounts of O_2 added to highly purified argon increase welding speed on steel. (K1, Al, SS, Cu)

431-K. Jobs You Can Do With Bronze Electrodes. F. E. Garriott. *Welding Engineer,* v. 36, July 1951, p. 20-24.

Many of the electrodes in the phosphor-bronze and Al bronze groups can be used interchangeably to weld Cu, Cu alloys, Ni-Cu alloys and Fe-base metals such as cast and malleable irons, high-carbon steels, low-alloy steels, toolsteels and Mn steels. Dissimilar metals and alloys are also joined with these electrodes. (K1, T5, Cu, Fe)

432-K. Welded Stainless for Dairies. Cvlde B. Clason. *Welding Engineer,* v. 36, July 1951, p. 25-28.

How equipment for the processing of milk and cream is welded from stainless by the inert-gas arc. (K1, SS)

433-K. Tanks of Welded Aluminum. Perry C. Arnold. *Welding Engineer,* v. 36, July 1951, p. 29-31.

Use of inert-gas arc welding for production of Al storage and pressure vessels. (K1, Al)

434-K. Practical Hints From a Consulting Engineer. (In German.) H. Schulz. *Schweissen und Schneiden,* v. 3, June 1951, p. 164-172.

A wide variety of welding problems applicable to both ferrous and nonferrous metals. (K general)

435-K. Reducing the Production Costs of Welded Railroad Cars. (In German.) M. Reiter. *Schweissen und Schneiden,* v. 3 June 1951, p. 178-182.

Factors which affect the costs of production. Practical suggestions supplemented by drawings and tabulated data. (K general, T23, CN)

436-K. Advances in the Field of Welding and Cutting; New Literature on Calculation of Welds. (In German.) H. Kunz. *Schweissen und Schneiden,* v. 3, June 1951, p. 190-191.

A review. 37 ref. (K general, G22)

437-K. Copper and Copper Alloys as Addition Materials in Welding and Soldering. (Concluded.) (In German.) Benno Sixt. *Schweisstechnik,* v. 5, Apr. 1951, p. 37-40.

Various factors that effect solderability of steel. Shows how Cu-alloy electrodes can be used for repair of Cu, brass, bronze, and cast iron. (K7, K1, Cu, CI)

438-K. (Book) **Mechanical Fastening Methods for Aluminum.** F. F. Dietsch. 136 pages. Reynolds Metals Co., 2500 S. 3rd St., Louisville, 1, Ky.

The many different ways for mechanically joining Al parts, including use of metal stitching, resin bonding, and mechanically formed joints. Other joints are made with rivets, screw fasteners, nails, or pins. Applications and advantages of each. (K13, Al)

439-K. (Book) **New Lessons in Arc Welding.** 320 pages. Lincoln Electric Co., Cleveland 17. $1.00 in the U. S.; $1.50 elsewhere.

Based on lessons and instruction given at the Lincoln Arc Welding School. Lessons are practical, not theoretical, and cover basic fundamentals of arc welding as well as more advanced welding of alloys, sheet metal, and pipe. The basic lessons cover welding mild steel in all positions and advanced lessons cover other welding applications. Practice material, exercises, questions and answers are given for each lesson. (K1)

440-K. Strength Behavior of Adhesive Bonds. H. P. Meissner and G. H. Baldauf. *Transactions of the American Society of Mechanical Engineers,* v. 73, July 1951, p. 697-702; disc., p. 702-704.

Tests on butt joints between metal cylinders using eutectic solder, wax, and polystyrene as adhesives indicate that the increase of bond strength is due primarily to the distribution of internal stresses in the adhesive layer. 14 ref. (K12, Pb, Cu)

441-K. Welding and Metals in Shipbuilding. C. F. Tilson. *Australasian Engineer,* May 7, 1951, p. 60-64.

Advancement of welding techniques used in shipbuilding. Application of various metals. (K general, T22, CN, SS, Cu, Al)

442-K. The Welding of Aluminium Alloys. *Australasian Engineer,* May 7, 1951, p. 65-69.

Methods of welding Al alloys: gas welding, metallic arc, carbon arc and atomic hydrogen. Techniques and applications. Methods of inspecting welds. Some types of machines and electrodes used in spot welding. (K1, K3, Al)

443-K. Stitch It Instead. Part II. A. G. Denne. *Iron Age,* v. 168, July 26, 1951, p. 78-82.

Types of stitching. Stitch penetration is limited by shear resistance of work. Al, steel, stainless, brass and Cu are commonly joined with themselves or to nonmetallic materials. Good stitching practice is necessary for best ultimate shear and tensile strengths. (K13, Al, CN, SS, Cu)

444-K. Methods of Joining Wrought Aluminium Alloys. Maurice Cook. *Light Metals,* v. 14, June 1951, p. 327-329; July 1951, p. 370-378.

Includes riveting, welding, brazing, soldering and nonmetallic bonding. (K general, Al)

445-K. Use of Notch-Coil Rings Boosts Brazing Production 62 Percent. *Machine and Tool Blue Book,* v. 47, Aug. 1951, p. 273-275.

Brazing of rings for electrical transformer connectors. (K8)

446-K. Flexible Sealers Find Wide Use in Industry. Kenneth Rose. *Materials & Methods,* v. 34, July 1951, p. 66-69.

Several types of materials available for sealing openings to prevent leakage of gas or liquid or to deaden vibration. Base materials include rubber, asphalt, vegetable oil, and synthetic resin. Industrial applications. (K12)

447-K. Structural Adhesives—Their Advantages, Their Limitations, Their Future. William E. Dirkes. *Materials & Methods,* v. 34, July 1951, p. 80-83.

Different types of adhesives, applicable to use in aircraft metal bonding, particularly epoxide resin. Problems involved. (K12)

448-K. Ultrasonic Soldering. *Metal Industry,* v. 79, July 13, 1951, p. 33.

An ultrasonic soldering bath which can be used in the rapid tinning of small, complex-shaped, aluminum and aluminum alloy articles. (K7, Al)

449-K. Series-Arc Welding. *Metal Progress,* v. 60, July 1951, p. 138, 140, 142. (Condensed from "Welding With Multiple Electrodes in Series—A New Method of Unionmelt Welding," by A. R. Lytle and E. L. Frost.

Previously abstracted from *Welding Engineer* and *Welding Journal.*

See items 37-K and 120-K, 1951. (K1)

450-K. Adequate Instrumentation Minimizes Welding Variables. J. Heuschkel. *Steel,* v. 129, July 23, 1951, p. 66-69, 88, 90.

Close control of all welding factors can result in major savings in manhours and dollars by guaranteeing consistently good results. Suitable welding conditions can be duplicated and poor operational practices avoided. Covers principally resistance welding, but includes instrumentation for arc welding, gas welding and brazing. (K3, K general)

451-K. "Push-Button" Soldering and Brazing. C. E. Eadon-Clarke. *Welding and Metal Fabrication,* v. 19, July 1951, p. 247-252.

Radio-frequency induction heating, resistance heating, and "Stanelco" electro-gas process, which can be push-button operated and process controlled for use by semi-skilled personnel in brazing and soldering operations. Data on comparative results of the methods are tabulated. (K7, K8)

452-K. Welding Copper - Bearing Stainless Steels. Helmut Thielsch. *Welding Journal,* v. 30, July 1951, p. 341s-347s.

Properties of weldments and effects of composition, heat treatments, welding technique, and welding processes of various commercial and experimental welding electrodes developed here and abroad. 20 ref. (K1, SS)

453-K. Welding Continuous Frames and Their Components. Progress Report No. 3: Plastic Design and the Deformation of Structures. Ching Huan Yang, Lynn S. Beedle and Bruce G. Johnston. *Welding Journal,* v. 30, July 1951, p. 348s-356s.

A study of the plastic behavior of continuous beams, the deformation of structures in the plastic range and a criterion for selection of the full load in the plastic design method. (K9, Q23, T26)

454-K. Connections for Welding Continuous Portal Frames. Progress

Report No. 4: Part I. A. A. Topractsoglou, Lynn S. Beedle and Bruce G. Johnston. *Welding Journal,* v. 30, July 1951, p. 359s-384s; disc., p. 384s.

An investigation of portal-type structure with various types of corner connections. Results of strength, yield and stiffness of several types of corner connections are indicated. 32 ref. (To be continued.) (Q23, K1, G22, T26, ST)

455-K. Field Welding of Aluminum Tanks. Perry C. Arnold. *Welding Journal,* v. 30, July 1951, p. 597-601.

How several large aluminum storage vessels were erected, including welding sequence to avoid distortion and warpage. The inert-gas shielded-arc method has made possible the strong, ductile, high-quality weldments that make quantity production possible. (K1, Al)

456-K. Stress Concentration Problems in Welded Construction. G. J. Green and D. H. Marlin. *Welding Journal,* v. 30, July 1951, p. 607-617.

Factors in stress concentration. Notches, design, welding defects, fabrication and welding tools, welding techniques, and related metallurgical factors, with illustrative examples. Methods of correcting some of the problems are given. (K general, Q25)

457-K. Sigma Welding of Nonferrous Metals and Alloy Steels. H. T. Herbst. *Welding Journal,* v. 30, July 1951, p. 618-631.

Hand and machine shielded inert-gas metal-arc welding and hard facing application. Equipment, atmosphere, and method for welding Al, Cu, Cu-alloys, carbon steel and stainless steel. (K1, L24, Al, Cu, CN, SS)

458-K. Quality Control of Structural Resistance Welding in Aircraft. J. R. Fullerton. *Welding Journal,* v. 30, July 1951, p. 631-633.

How basic standards for quality and procedures are outlined in the current military specifications for spot and seam welding of aircraft materials which can be modified to suit the facilities and requirements of an individual factory. (K3, T24)

459-K. Design Data for Brazing. Part II. Filler Metals and Fluxes. Part III. Basic Design of Joints for Brazing. W. J. VanNatten. *Welding Journal,* v. 30, June 1951, p. 540-543; July 1951, p. 634-637.

Advantages, limitations, composition, characteristics, and recommended clearances for the following groups of brazing alloys and fluxes: Cu, Ag alloys, and Al alloys. Part III: principal type of joints and design information for each. (K8, Cu, Ag, Al)

460-K. Welding Trims Steel From Heavy Trusses. LaMotte Grover and Gilbert D. Fish. *Engineering News-Record,* v. 147, Aug. 2, 1951, p. 30-32.

Changing from riveting to welding reduced steel tonnage about 30% for three heavy trusses in new additions to Mt. Sinai Hospital, New York City. (K1, T26, CN)

461-K. Bolted Joints Found Better Under Fatigue. T. R. Higgins. *Engineering News-Record,* v. 147, Aug. 2, 1951, p. 35-36.

Laboratory tests and field experience have demonstrated the superiority and economy of structural steel connections made with high-tensile steel bolts. In comparison with ordinary riveted and bolted connections, these bolts are particularly advantageous for structures subjected to widely fluctuating dynamic loading. (K13, CN)

462-K. Stud Welding Comes Aboard. *Marine Engineering and Shipping Review,* v. 56, Aug. 1951, p. 68-70.

Shipbuilding applications of stud welding. (K1)

463-K. Design for Flashwelding. Gilbert C. Close. *Industry & Welding,* v. 24, July 1951, p. 24-26; Aug. 1951, p. 34, 37, 55-57.

An illustrated description of the process and its advantages. Part II: inspection procedures and new applications. (K3)

464-K. Efficient Use of Welding Fittings. George Hart. *Industry & Welding,* v. 24, Aug. 1951, p. 44-45, 47-48, 52.

Use of fittings in pipe outlets. (K1, K2)

465-K. Welding the Navy's Warplanes. Howard E. Jackson. *Modern Machine Shop,* v. 24, Aug. 1951, p. 100-104.

Equipment and facilities at Sand Point Naval Station for welding and testing the welds. (K9)

466-K. Low Melting Temperature Solders in Metal-Ceramic Seals. R. J. Bondley. *Ceramic Age,* v. 58, July 1951, p. 15-18.

By use of ductile-metal solders and Ti hydride, nonmetallic materials having widely different physical properties can be soldered to metals or other nonmetallic substances. The joints formed are strong and, if properly made, completely vacuum proof. (K7, SG-f)

467-K. Induction Brazing—Short Cut to Greater Output. John A. Evans. *Welding Engineer,* v. 36, Aug. 1951, p. 18-21.

Steel below the Curie point

(1420° F) can be heated about 100 times as fast by induction heat as with a furnace having a wall temperature of 2000° F. (K8, ST)

468-K. Cleaning Costs Took a Nose Dive. Jack Medoff. *Welding Engineer*, v. 36, Aug. 1951, p. 30-32.

Refers to the cleaning of Japanese ship-cargo tanks for transportation of vegetable oil. Use of stainless steel tanks reduced the cost of between-trip cleanings from the $3000-$4000 range to less than $1000. Welding details. (K1, SS)

469-K. Fabricated Beams for Welded Buildings. Ross Yarrow. *Welding Engineer*, v. 36, Aug. 1951, p. 33-35.

Briefly discusses each of the main processes involved in structural fabrication, including design detailing, templates, layout, punchings, fitting, welding, inspection, and erection. (K1, T26, CN)

470-K. Welded Aluminum Piping. Dan R. Cheyney. *Welding Engineer*, v. 36, Aug. 1951, p. 36-39.

Details of inert-arc welding process, thermal effects, allowable design stresses, selection of alloys, and advantages over other types. (K1, T27, Al)

471-K. Welded Sphere for Liquid Nitrogen. Fred M. Burt. *Welding Engineer*, v. 36, Aug. 1951, p. 40-42.

Fabrication from curved segments of Type 347 stainless 3½ in. thick. (K1, T26, SS)

472-K. Oxygen-Argon Mixture Speeds Sigma Welding of Steels. *American Machinist*, v. 95, Aug. 6, 1951, p. 154-155.

A new principle which multiplies the speed of sigma welding of stainless and carbon steel. A mixture of O_2 and A was used as a shielding atmosphere. (K1, SS, CN)

473-K. How to Get Better Welding Results With 17% Chromium Stainless. T. A. Pruger. *Steel Horizons*, v. 13, No. 3, 1951, p. 10-12.

One possible substitute for Cr-Ni or austenitic stainless steels is Type 430 or 17% Cr stainless. Its main drawback is low ductility after welding, possible added costs of fabrication, and lower corrosion resistance as compared with austenitic grades. Results of experiments on effects of various heat treatments on ductility, also of atmospheric weathering and laboratory corrosion tests, on this material. Recommended arc welding and heat treating procedures. (K1, J general, SS)

474-K. Welding Characteristics of Open Hearth and Bessemer Seamless Steel Pipe. A. B. Wilder, W. B. Kennedy, and F. W. Crouch. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 763-780; disc., p. 781-788.

Welding characteristics of ASTM Specification A-53 Grade B, seamless steel pipe, especially properties related to deoxidation and steelmaking practice. Properties of girth welds and laboratory bead welds. Tension and bend tests were made on girth welds. A new type of weldability test is the weld-bead flattening test for tubular products. Internal structure and hardness of the girth and bead welds and advantages of multipass welding. Impact properties of the girth welds. (K9, Q general, CN)

475-K. Welds Between Dissimilar Alloys in Full-Size Steam Piping. R. U. Blaser, F. Eberle, and J. T. Tucker, Jr. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 789-808; disc., 858-860.

Factors affecting the safe operation of ferritic-austenitic weld joints in large-size steam piping were studied by means of a simulated proof test. The specimen consisted of a 10¾-in. diam. section of 2¼ Cr + 1 Mo steam pipe welded to end-pieces of 18 Cr + 8 Ni-Cb wrought and 16 Cr + 13 Ni + 2 Mo-Cb cast materials, using 19 Cr + 9 Ni-Cb welding electrodes. Cracks were detected by radiographic means in the pipe at the edge of the weld after 4631 hr. at 1100° F. and 1500 psi., involving 47 shutdowns to atmospheric conditions. Metallurgical examination showed the principal factors contributing failure. (K7, AY, SG-h)

476-K. Some Considerations in the Joining of Dissimilar Metals for High-Temperature High-Pressure Service. O. R. Carpenter, N. C. Jessen, J. L. Oberg, and R. D. Wylie. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 809-857; disc., p. 858-860.

Metallurgical factors, performance, and fabrication of joints. Failures of field welds of dissimilar metals under severe operating conditions are shown as examples. Welding techniques and developments designed to minimize possibility of failure. Stabilization of carbides in the ferritic materials was studied. (K9, SS, AY)

477-K. The Measurement of Dynamic Modulus in Adhesive Joints at Ultrasonic Frequencies. A. G. H. Dietz, P. J. Closmann, G. M. Kavanagh, and J. N. Rossen. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 1414-1426; disc., p. 1427.

Equipment for obtaining the nec-

essary resonance properties, the resonant frequency and half-power band width. Measurements were made on stainless-steel bar specimens, cemented with a phenol-formaldehyde adhesive, which were subjected to various heat treatments. Results indicate that the measured dynamic modulus is useful for selecting from a group of treated specimens those which have deteriorated and have low tensile strength. The method is applicable to cemented-bar specimens composed of other types of bars and adhesives, provided that certain conditions are met. (K13, Q23)

478-K. Weld That Defective Casting! *Canadian Metals*, v. 14, July 1951, p. 24-26, 28.

How recovery of defective iron castings can be achieved by proper use of repair welding.
(K general, CI)

479-K. 600-Amp. Argon-Arc Torch for Manual Welding Thick Aluminum Alloy Plate. J. H. Cole. *Welding Research*, v. 5, Apr. 1951, p. 157r-162r.

Construction and operating characteristics of a manual torch capable of carrying up to 600 amp. Experimental butt and fillet welds in 1-in. Al alloy using a single-pass technique. (K1, Al)

480-K. Machine Characteristics for Flash Welding Aluminium Alloys. H. E. Dixon and J. H. Gameson. *Welding Research*, v. 5, Apr. 1951, p. 163r-172r.

A summary of existing information on the flash welding of light alloys. Properties of light alloys and their likely effect on desirable machine characteristics. Data on physical and mechanical properties of materials and welds are tabulated. 26 ref. (K3, Al)

481-K. The Fabrication of Heavy Welded Pressure Vessels. *Machinery* (London), v. 78, June 21, 1951, p. 1019-1028.

Forming and welding equipment and procedures of British plant.
(K general, G1, T26, CN)

482-K. The Fabrication of Heavy Welded Pressure Vessels. *Machinery* (London), v. 79, July 19, 1951, p. 108-112.

Procedures and equipment of a British plant, specifically for fusion welding the seams, radiographic examination, and thermal stress relief. (K general, T26, S13, J1, ST)

483-K. Correspondence on the Paper —Effect of Cooling Rate and Composition on the Embrittlement of Weld Metal. *Journal of the Iron and Steel Institute*, v. 168, July 1951, p. 259-260.

Deals with paper by E. C. Rollason and R. R. Roberts (v. 166, p. 105-112; see item 697-K, 1950.) Includes author's reply. (K9, Q23, CN)

484-K. Welding in Relation to Gas Turbines for Use on Land. J. M. Robertson. *Transactions of the Institute of Welding*, v. 14, June 1951, p. 68-73.

The welding application and problems involved vary with the type of turbine concerned. Where the turbines resemble aircraft types from the point of view of the size of the components and assemblies, the welding applications and problems are similar to those that arise in connection with aircraft units, and, where the turbines resemble large steam turbines, the welding applications and problems have much in common with those involved in high-temperature steam plant. Materials used such as ferritic steels containing alloying elements and austentic steels are considered. 10 ref. (K general, T25, SS, AY)

485-K. Developments of Design and Fabrication in Recent British Structures. W. S. Atkins and E. M. Lewis. *Transactions of the Institute of Welding*, v. 14, June 1951, p. 74-84.

Describes two welded structures in Great Britain which are now nearing completion.
(K general, T26, CN)

486-K. Welding on Gas Turbine Engines for Aircraft. H. E. Lardge. *Transactions of the Institute of Welding*, v. 14, June 1951, p. 85-91.

Fusion and resistance welding processes are used in the construction of gas-turbine engines for aircraft. A brief description of a typical jet-propulsion engine, together with some remarks on the materials used. (K1, K2, K3, T25, AY, CN)

487-K. Welding of Heat-Resistant Alloys in Sheet Form. H. E. Lardge. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 217-224.

Sheet-metal parts of a typical jet propulsion unit. Characteristics of the austenitic steels and high nickel-chromium alloys which intimately affect welding. Use of the oxy-acetylene torch and the carbon, argon, and metallic-arc processes. Techniques developed for the resistance processes of spot, stitch, and seam welding, as applied to gas-turbine work. The electrical resistance hot-riveting process. 10 ref.
(K general, SS, AY)

488-K. Weld-Metal Properties and Welding Characteristics of Two Austenitic Steels Used for Gas-Turbine Rotors. E. Bishop and W. H. Bailey. *Iron and Steel Institute.* "Symposium

on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 225-232.

The room-temperature mechanical properties of all-weld-metal specimens, and of numerous butt-joints welded in 1-in. thick plates of the corresponding steels are reported. The welds were radiographed, and transverse sections were cut for mechanical testing. The mechanical properties of the welded joints, as-welded and after heat treatment, were investigated at room temperature. Also included are the creep properties at appropriate high temperatures. 12 ref. (K9, AY)

489-K. Automatic or Manual Welding? (Continued.) (In German.) Hermann Stern. *Schweisstechnik,* v. 5, Apr, 1951, p. 40-46; May 1951, p. 49-56.

Important factors in manual electric-arc welding, and mechanical, metallographic, and X-ray analysis of the resulting welds. A description of different processes, property tests and comparison of automatic and manual welding procedures. 36 ref. (K1)

490-K. Argon Arc Welding of Aluminum. (In German and French.) E. Zurbrügg. *Aluminium Suisse,* July 1951, p. 115-124.

Principles of argon-arc welding with d.c. and a.c. current; required equipment; condition of protective gas; advantages and possible applications; and details of welding procedure. 11 ref. (K1, Al)

491-K. Proper Designs for Lead Welding. (In German.) C. G. Keel. *Zeitschrift für Schweisstechnik,* v. 41, July 1951, p. 119-124.

Methods of joining lead tubes by welding. (K general, Pb)

492-K. How to Save 30% on Steel. *Architectural Forum; The Magazine of Building,* v. 95, Aug. 1951, p. 152, 88, 92-93, 100.

Various engineers discuss article by Van Rensselaer P. Saxe on welded structures. (See item 329-K, 1951). (Mar. and May 1951). In general his conclusions are supported. (K general, T26, CN)

493-K. New Cold Welding Techniques. *Automotive Industries,* v. 105, Aug. 15, 1951, p. 41, 122.

One new development is a method for cold butt welding of rods and wires such as Al-to-Al, Al-to-Cu, and Cu-to-Cu, without application of heat or electricity. Improvements have also been made in the manufacturing techniques for producing tubing from flat ribbon and sheet stock by the Koldwelding process. (K5)

494-K. Welding Pipe and Tubes of Nickel and High-Nickel Alloy. *Heating and Ventilating,* v. 48, Aug. 1951, p. 77-80.

Approved methods for welding pipe and seamless tubes fabricated of nickel and high-nickel alloy. Brazing techniques. (K1, K8, Ni)

495-K. Electric Furnace Brazing Provides High Production Rate at Low Cost for Superweld Corp. *Industrial Heating,* v. 18, Aug. 1951, p. 1356-1360, 1362, 1364, 1366, 1368, 1506, 1508, 1510.

Application of electric furnace brazing. Materials used and properties of the brazed bond. Advantages. (K8, SG-f)

496-K. Resistance Welding of Aluminum, Steels and Coated Metals Improved by Slope Control. F. L. Miller. *Materials & Methods,* v. 34, Aug. 1951, p. 80-82.

Shows that welding heat applied gradually at beginning of the weld by use of slope control increases production and permits successful welds on materials not previously considered practical. (K3, Al, ST)

497-K. Soldering and Brazing. W. J. Smellie. *Metal Industry,* v. 79, July 20, 1951, p. 43-45; July 27, 1951, p. 67-70; Aug. 3, 1951, p. 83-86.

A concise general account of soldering common metals, excluding Al and Mg, indicating when to use soldering as a production process and roughly what solders and production methods are available for joints required to withstand varying service conditions. Soldering of plated metals and vice versa. Data on properties of Ag, Au, Cu-Zn, Pt and Sb-Pb solders are tabulated in the 2nd part. Concluding installment emphasizes practical applications. (K7, SG-f)

498-K. Welding Fractures. E. P. DeGarmo. *Metal Progress,* v. 60, Aug. 1951, p. 74-77.

General discussion of causes and remedies. Emphasizes importance of design and heat treatment. Requirements of weldable steels and unsolved problems. (K9, ST)

499-K. Automatic Welding on Pipe-Line Right-of-Way Demonstrated. Paul Reed. *Oil and Gas Journal,* v. 50, Aug. 16, 1951, p. 148, 151.

How possibilities of automatic submerged-arc welding on a pipeline right-of-way recently were indicated in a demonstration for Oklahoma Natural Gas Co. (K1, CN)

500-K. Welding Costs Reduced One-Fourth Using Mobile Unit for Right-of-Way Double Jointing. R. L. Looney. *Oil and Gas Journal,* v. 50, Aug. 16, 1951, p. 149-150.

Equipment and procedure developed by Hilco, Inc. of Tulsa, and currently in use on a 30-in. pipeline job in Indiana. This machine, employing the hidden-arc welding process, reduces cost by 25% and saves about 40% of the manual welding electrodes normally used. (K1, CN)

501-K. Submerged Arc Welding of Pipe on the Line. Frank H. Love. *Petroleum Engineer,* v. 23, Aug. 1951, p. D7-D8.

Multiple-jointing method. (K1, CN)

502-K. Recommended Practice for the Repair and Reclamation of Non-Ferrous Castings. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A121-A134; disc., p. A135-A143.

A committee report. 48 ref. (K general)

503-K. Code of Practice for the Repair and Reclamation of Gray-Iron Castings by Welding and Allied Methods. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A114-A122; disc., p. A135-A143.

A committee report. (K general)

504-K. Aluminium Overcoat "Made to Measure" for the "Skylon". R. W. Hancock. *Sheet Metal Industries,* v. 28, Aug. 1951, p. 711-716.

Manufacture of aluminum louvres for the vertical feature of the South Bank Exhibition in England. Riveting and bolting are emphasized. (K13, T26, Al)

505-K. An Investigation Into the Cracking of the More Common Binary Alloys During Argon-Arc Welding. D. C. Moore. *Sheet Metal Industries,* v. 28, Aug. 1951, p. 739-752.

The work was carried out on binary alloys of Al with Si, Cu, Mg, Mn, Fe, and Zn, all the alloys being prepared from super-pure Al and alloying elements of high purity, and so melted and cast as to reduce contamination to a minimum. Details of standardized experimental procedure and apparatus used, which included temperature-distribution tests on an Al + 4% Cu alloy. 20 ref. (K1, Al)

506-K. Assemblies Economically Produced by Brazing and Soldering. N. M. Salkover. *Steel,* v. 129, Aug. 20, 1951, p. 69-70.

Equipment and procedures of Technical Metal Processing, Inc., Cleveland, which does many jobs in continuous furnaces. Batch-type furnaces and induction heaters are also used. (K7, K8)

507-K. Welded Extension Saves Shaft Stock. *Steel,* v. 129, Aug. 20, 1951, p. 75-76.

By welding a 1⅛-in. diameter extension to an armature shaft turned from 3⅛-in. stock, rather than turning down the small diameter extension from the rough stock, Lincoln Electric Co. saves 25 lb. of shaft stock per armature. Semi-automatic hidden-arc welding is used, two passes giving complete penetration plus sufficient weld build-up to permit final machining of the weld. (K1, ST)

508-K. Design Data for Brazing. Part III. Basic Design of Joints for Brazing. Part IV. (No subtitle.) W. J. VanNatten. *Welding Journal,* v. 30, July 1951, p. 634-637; Aug. 1951, p. 737-741.

Part III: principal types of joints, and design information for each. Includes lap or shear, scarf, and butt joints. Part IV: brazing processes (heating methods) as follows: resistance brazing, induction brazing, furnace brazing, torch brazing, dip brazing (metal bath), and dip brazing (chemical bath). (K8)

509-K. Resistance Welding of Nickel and High-Nickel Alloys. R. M. Wilson, Jr. *Welding Journal,* v. 30, Aug. 1951, p. 685-710.

Detailed practical information and engineering data on spot, projection, seam, flash welding, and resistance brazing. (K3, K8, Ni)

510-K. Fundamentals of Inert-Gas-Shielded-Arc Welding. H. E. Rockefeller. *Welding Journal,* v. 30, Aug. 1951, p. 711-716.

Fundamentals and major developments, present stage of application, and expected future trends. Historical development, equipment, sigma welding and its comparison with heliarc welding, welding of Al, stainless steel, carbon steel, and Cu and Cu alloys. (K1, ST, Al, Cu)

511-K. Charateristics of Inert-Gas-Shielded Metal-Arcs. A. Muller, W. J. Greene, and G. R. Rothschild. *Welding Journal,* v. 30, Aug. 1951, p. 717-727.

Characteristics of inert-gas-shielded metal arcs including relationship between voltage, current, and arc length; radiation; material transfer; and stability. (K1)

512-K. Pressure Welding. Part I. History. Part II. Cold-Pressure Welding. F. C. Kelley. *Welding Journal,* v. 30, Aug. 1951, p. 728-736.

History, including a brief review of principal patents and literature. Physical properties, structures, equipment, and applications. Importance of thorough cleaning of surfaces to be joined. Results of tests on the cold welding of various metals and metal combinations are tabulated. 23 ref. (K5)

513-K. Rotary Fixture Welds Plowshares, One a Minute. *Welding Journal,* v. 30, Aug. 1951, p. 745.

Unionmelt process used by Allis-Chalmers. (K1, ST)

514-K. Automatic Welding With Flux Shielding (The Elin Chain System). W. Senft. *Welding Journal,* v. 30, 1951, p. 416s. (Translated and condensed from *Elin Zeitschrift,* v. 3, Mar. 1951, p. 35-39.)

The system is briefly described, diagrammed, and illustrated. (K1)

515-K. Cold Pressure Welding. *Wire Industry,* v. 18, Aug. 1951, p. 708-710.

The process and its applications. (K5)

516-K. Research on Steel Welding Rods Containing Manganese and Silicon in the Core. (In English.) Harujiro Sekiguchi. *Japan Science Review,* v. 1, Dec. 1950, p. 19-24.

Shows that steel rods containing suitable quantities of deoxidizers such as Mn and Si have better welding characteristics. Applications. (K1, T5, ST)

517-K. When and How to Use Induction Soldering. E. M. Wharff. *American Machinist,* v. 95, Sept. 3, 1951, p. 166-168.

Major factors to be considered in deciding whether or not to use induction method. Recommended procedures and typical set-ups. (K7)

518-K. Silver Brazing of Nickel Alloys. *American Machinist,* v. 95, Sept. 17, 1951, p. 169, 171, 173.

Procedures, which vary somewhat, depending upon the different chemical, mechanical, and physical properties of the alloys being joined. Diagrams and tables. (K8, Ni)

519-K. Shielded Arc Welding of Aluminum and Stainless Steel. George Pettit. *Canadian Metals,* v. 14, Aug. 1951, p. 52, 54, 56.

Application of Aircomatic process for maintenance and equipment construction work in the mining industry. (K1, Al, SS)

520-K. Ultrasonic Soldering Bath. *Electronics,* v. 24, Sept. 1951, p. 212, 216.

Rapid tinning of small Al and Al-alloy articles by an ultrasonic soldering bath. The process is expected to find extensive use in making connections for capacitor foils, in the tinning of Al galvanometer suspensions, and in the soldering of small tubes and sections to anchorings or mountings. (K7, Al)

521-K. Structural Light-Alloy Riveting With the High-Tensile Alloys. J. G. Whitman. *Engineer,* v. 192, Aug. 24, 1951, p. 228-231.

Development work at the Military Engineering Experimental Establishment in Britain and the fundamental reasons for what appears to be a new approach to the problem. (K13, Al, Mg)

522-K. Revolutionary Advance in Dairy Engineering: Permanent Welded Pipelines. C. R. Havighorst. *Food Engineering,* v. 23, Sept. 1951, p. 74-79.

Permanent welded pipe lines cut plant cleanup costs more than 25%, and reduce bacterial contamination, product losses, and plant maintenance. Special oxy-acetylene and arc welding techniques are used. Material welded is stainless steel. (K1, K2, SS)

523-K. Neat as a Weldment. *Industry & Welding,* v. 24, Sept. 1951, p. 64, 92-93.

Production of stator frames that cost and weigh less, yet are stronger than the bulky castings they replace. Frames are fabricated from hot rolled mild steel and arc welded into place. (K1, ST)

524-K. How Welding Salvages Broken Tools and Dies. L. D. Richardson. *Iron Age,* v. 168, Sept. 13, 1951, p. 162-165.

Techniques and examples of applications. (K1, K2, ST, AY)

525-K. Welding Procedures for High-Pressure, High-Temperature Steam Piping. N. L. Navarre. *Journal of the American Society of Naval Engineers,* v. 63, Aug. 1951, p. 692-703.

Previously abstracted from original in *Welding Journal.* See item 79-K, 1951. (K1, J1, AY, SS SG-h)

526-K. Lead-Tin Alloy Plating for Solderability. J. W. Cuthbertson. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 99-106. (Preprint.)

Electrodeposited Sn is widely used to facilitate soldering of brass, Cu, and steel. A recent publication claims that Pb-Sn electrodeposits are superior for this purpose, in that solderability does not deteriorate on storage. Surveys possible advantages, history, constitution of Pb-Sn alloy plating baths, effects of addition agents, plating procedures, and solderability. 10 ref. (K7, L17, Cu, ST, Pb, Sn)

527-K. Aircomatic Process Used in Welding Aluminum Masts for Navy. *Marine Engineering and Shipping Review,* v. 56, Sept. 1951, p. 58-60. (K1, Al)

528-K. Welding with Bronze Electrodes. F. E. Garriott. *Metal Industry,* v. 79, Aug. 24, 1951, p. 143-147.

Factors involved in the selection of the proper electrode for any given application. Discussion is limited to electrodes of the Sn and Al bronze classifications. (K1, Cu)

529-K. Submerged Arc Welding. *Overseas Engineer,* v. 25, Sept. 1951, p. 67.

The Unionmelt process. It has recently been developed as a semi-automatic unit, or as a manual tool to be positioned and guided by the welding operator. Two types of this manual equipment. (K1)

530-K. Resistance Welding for Production. Howard E. Jackson. *Industry and Welding,* v. 24, Sept. 1951, p. 48-52, 54.

Advantages of flash, spot and projection welds as applied to production of aluminum and steel window frames. (K3, Al, ST)

531-K. Are You Welding Cast Iron? H. B. Bott. *Industry and Welding,* v. 24, Sept. 1951, p. 32-33, 90.

Welding of cast iron parts using nickel-base electrodes. (K1, T5, CI, Ni)

532-K. Thermit Welding Widely Used in Steel Industry. James M. Wilson. *Steel,* v. 129, Sept. 3, 1951, p. 106, 109.

Reviews applications. (K4, ST)

533-K. Cool Water for Spot Welding. *Welding Engineer,* v. 36, Sept. 1951, p. 36-37.

A money-saving method developed to recirculate the water used to cool spot welders and other equipment. (K3)

534-K. Welding a Seagoing Pipe Line. R. C. Ledford and Elton Sterrett. *Welding Engineer,* v. 36, Sept. 1951, p. 38-39, 106.

The hazards and difficulties met and overcome in laying a pipe running 12 miles out into the Gulf of Mexico. (K2, ST)

535-K. New Kansas Plant Finds Many Uses for Welding. T. B. Jefferson. *Welding Engineer,* v. 36, Sept. 1951, p. 40-42.

Varied applications of welding in new plant of Tweco Products Co., Wichita, Kansas, to enhance appearance, save space, and insure greater safety. (K general)

536-K. Box Girders for Bridge Support. *Welding Engineer,* v. 36, Sept. 1951, p. 43-45.

Unique box-girder construction of three welded bridges in western Washington. (K1, T26)

537-K. Maintenance Welding in a Defense Program. John D. Redmond. *Welding Engineer,* v. 36, Sept. 1951, p. 46-50.

Ten uses of the oxyacetylene flame in general plant-maintenance work. Includes cutting, braze welding, brazing, welding, hard-facing, flame hardening, and flame cleaning. (K2, G22, L24, J2)

538-K. Welding Practices at John Deere Yakima Works. Howard E. Jackson. *Welding Engineer,* v. 36, Sept. 1951, p. 54-55.

Mass-production methods for arc-welded parts of farm implements at above plant. (K1, T3)

539-K. Welded Plate Fabrication. P. L. Pocock. *Welding & Metal Fabrication,* v. 19, Aug. 1951, p. 278-284.

Procedures and equipment at Redheugh Iron & Steel Co., Gateshead, England. Includes oxy-cutting, plate bending, milling and drilling. Materials are mild steel, stainless steel, and Ni. (K general, G22, G6, G17, CN, SS, Ni)

540-K. Attachment of Flanges by Welding. E. J. Heeley. *Welding & Metal Fabrication,* v. 19, Aug. 1951, p. 285-292.

Bolt-loading tests carried out on representative flanged pipes demonstrated that the form of weld system described for attaching flanges to pipes is satisfactory for the highest loadings which can safely be applied to the flanged item. The combination of a suitable groove weld at the jointing surface of a flange, together with the appropriate fillet weld at the back of a flange, is an adequate form of welded-flange attachment, irrespective of internal pressure of liquid or vapor in the vessel, branch or pipe. (K1, ST)

541-K. The New Twin-Arc Process. *Welding & Metal Fabrication,* v. 19, Aug. 1951, p. 297-300.

Development of the process, and equipment. Electrical and operational data. (K1)

542-K. Building Welded Ships at Barrow. Rolt Hammond. *Welding & Metal Fabrication,* v. 19, Sept. 1951, p. 316-325.

Progress report on what has been achieved at Vickers-Armstrongs' Naval Construction Works to insure that welding shall be of the highest quality obtainable and that it satisfies the most stringent requirements of inspection. (K general, S13, ST)

543-K. Marine Engine Production. *Welding & Metal Fabrication,* v. 19, Sept. 1951, p. 326-329.

Most of the welding is done with mild steel coated rods. Ship-quality mild steel is used throughout. (K1, CN)

544-K. All-Welded Passenger Coaches for Canada. *Welding & Metal Fabrication,* v. 19, Sept. 1951, p. 339.

Welding procedure. Inert-gas-shielded welding process is used whenever Al, stainless steel, Monel, or Inconel are used. (K1, Al, SS, Ni)

545-K. Trends in British Resistance Welding. *Welding & Metal Fabrication,* v. 19, Sept. 1951, p. 340-346.

Views expressed by the following: R. W. Ayers, Sciaky Electric Welding Machines, Ltd.; A. E. Dixon, British Welding Research Association; R. J. F. Howard, British Electronic Products (1948) Ltd.; H. E. Lardge, Joseph Lucas Gas Turbine Equipment, Ltd.; L. H. Leedham, National Gas Turbine Establishment; W. S. Simmie, Pressed Steel Co., Ltd.; J. M. Sinclair, A. I. Electric Welding Machines, Ltd.; and C. E. Slade, Philips Electrical, Ltd. (K3)

546-K. Welded Robinson Structure Permits 15% Steel Saving. Fred M. Burt. *Western Metals,* v. 9, Aug. 1951, p. 33-34.

New all-welded building of J. W. Robinson Co., Beverly Hills, Calif. How it was erected and material savings achieved. (K1, T26, CN)

547-K. Metal Stitching Speeds Rubber-to-Aluminum Assembly. *Western Machinery and Steel World,* v. 42, Aug. 1951, p. 78.

Advantages of the method are greater savings in time and cost. (K13, Al)

548-K. Welding of Turbine Elements With Electrodes Having a High Fusion Coefficient. (In French). G. Doneux *L'Ossature Métallique,* v. 16, May 1951, p. 222-224.

Arc welding of Kaplan-type turbines made of carbon steel. (K1, CN)

549-K. Electric Arc Welding Apparatus and the Pertinent New French Standards. (In French.) A. Gaubert. *L'Ossature Métallique,* v. 16, June 1951, p. 277-286.

(K1, S22)

550-K. (Pamphlet) **Solders and Soldering.** National Bureau of Standards, Circular 492, 1950, 12 pages. (For sale by U. S. Govt. Printing Office, Washington 25, D. C.) 15c.

Types of solders and soldering procedures. The three classes of solders treated are soft solders, precious metal solders, and common brazing solders. Instructions for proper use of each type of solder for joints of the required strength. Selections of fluxes. All common soldering alloys are listed and their component elements, together with their melting ranges. Illustrations of different types of soldered joints and types of soldering equipment. (K7, SG-f)

551-K. (Book) **Welding Principles for Engineers.** J. L. Morris, 511 pages, Prentice-Hall, Inc. 70 Fifth Ave., New York 11, N. Y. $7.00.

A college text for enginering students. Presents the science of welding strictly from the engineering standpoint. (K general)

552-K. Instrumentation Minimizes the Welding Variable. J. Heuschkel. *Instruments,* v. 24, Sept. 1951, p. 1034-1041.

Previously abstracted from *Steel.* See item 450-K, 1951. (K3, K general)

553-K. Automatic Gas Soldering Gives Better, Cheaper Joints. *Iron Age,* v. 168, Sept. 20, 1951, p. 130.

A new soldering setup which gives an improved pipe-to-tank joint. Gas heat and electronic controls are used. (K7)

554-K. Welding in the Shipyard; Value and Application. E. Dacre Lacy. *Iron and Steel,* v. 24, Sept. 1951, p. 423-425.

Various applications of the different welding processes to ship construction. (K general, T22, ST)

555-K. Stud Welding the Aluminium-Magnesium Alloys. D. C. G. Lees. *Light Metals,* v. 14, Sept. 1951, p. 473-476.

Results of a series of tests. Present indications are that stud diameter should not exceed twice the plate thickness. (K1, Al, Mg)

556-K. Welding and Brazing Seamless Nickel Tubing. (Concluded). *Machinery* (American), v. 58, Sept. 1951, p. 156-159.

Methods recommended by the International Nickel Co. for joining Ni and high-Ni alloy seamless tubing by arc, oxy-acetylene, or inert-gas metal-arc welding; silver or copper brazing; or soft soldering. (K1, K2, K7, K8, Ni, Ag, Cu)

557-K. Reclaiming Tracta Joint Housings by Welding and Re-Machining. *Machinery* (London), v. 79, Sept. 6, 1951, p. 415-417.

Refers to universal-joint housings of armored tanks. Arc welding and machining are used. (K1, G17, CN)

558-K. High Quality Welds Obtained With Low Hydrogen Electrodes. Edwin Laird Cady. *Materials & Methods,* v. 34, Sept. 1951, p. 90-91.

Advantages, weld characteristics, and applications, as applied to steels. (K1, T5, ST)

559-K. Koldweld Progress. *Modern Metals,* v. 7, Sept. 1951, p. 55-56.

The Koldweld Process, which is claimed to produce strong, dense, dependable pressure welds with a minimum of difficulty. Some typical examples with particular reference to Al. (K5, Al)

560-K. Reclaiming Aluminum Diesel Locomotive Parts. La Motte Grover and R. L. Rex. *Railway Mechanical and Electrical Engineer,* v. 125, Sept. 1951, p. 56-59.

Use of inert-gas-shielded welding processes. (K1, Al)

561-K. All Welded Support For Multiple Platen Press. Otto E. Hermanns *Rubber Age,* v. 69, Sept. 1951, p. 707-712.

Advantages of a welded support compared to a similar riveted one. A detailed outline of cast analyses is also given. (K general, T5)

562-K. Aircraft Riveting. H. Giddings. *Sheet Metal Industries,* v. 28, Sept. 1951, p. 833-850.

From the standpoint of the structural designer. Functions of the riveted joint and various types of rivets in current use. Theoretical and test data on strengths, and fatigue and repeated loading characteristics. Rivet weights and riveting economics.
(K13, Q general, ST, Al)

563-K. Seam Welding Containers Automatically. C. S. Seltzer. *Welding Journal,* v. 30, Sept. 1951, p. 791-800.

Details of design of an automatic body-welding unit for steel containers. (K3, CN)

564-K. Trends in Electronic Nonsynchronous Resistance Welding Controls. Stuart Rockafellow. *Welding Journal,* v. 30, Sept. 1951, p. 801-802.
(K3)

565-K. The Application of Spot and Seam Welding to Design. S. P. Jenkins and T. P. Piper. *Welding Journal,* v. 30, Sept. 1951, p. 803-809.

The versatility and high-quality consistency of spot and seam welds obtained with present-day equipment and techniques as compared with that obtained from home-made resistance welding equipment of 20 years ago. Application of resistance welding to structural and nonstructural aircraft components, especially emphasizing spot welding. Urgent need for research and development programs to furnish engineers with suitable application design data for resistance welding. (K3)

566-K. High-Speed Consumable Electrode Machine Welding for Aircraft. Bernard Gross and Robert A. Smith. *Welding Journal,* v. 30, Sept. 1951, p. 812-816.

Techniques developed for satisfactory machine welding using an inert-gas shielded consumable electrode with speeds many times faster in aircraft application than those previously used. Macrographs show welds in various stainless steels and Al alloys. (K1, SS, Al)

567-K. The Arc Welding of Carbon-Molybdenum Steel Pipe. F. J. Winsor. *Welding Journal,* v. 30, Sept. 1951, p. 817-827.

Effects of preheating and stress relieving on properties of welds in C + 0.5% Mo steel pipe furnace tubing, and flange stock. For service temperatures above 800° F., preheating and stress relieving should not be required for welds made with cellulose-coated, Class E7010, electrodes in A206, A161, A234 and A182 C-Mo steels in thicknesses up to at least ¾ in. For welds made with Mn-Mo low-hydrogen electrodes, in the same range of thickness in these materials, preheating and stress relieving should not be required regardless of service temperature. The free-bend test, required by various codes for qualification of welding procedure, was found to be of questionable value as an indicator of the serviceability of welded joints. (K1, AY)

568-K. Welding Versus Waste. Alois Cibulka. *Welding Journal,* v. 30, Sept. 1951, p. 831-832.

Criticizes structural engineers for their slowness in adopting material-saving designs and procedures. Example shows how large amounts of steel can be saved by proper design and use of welding.
(K general, CN)

569-K. Methods Improvement in Welding. S. Tilles. *Welding Journal,* v. 30. Sept. 1951, p. 832-833.

Check-list of question designed to aid in the above. (K general)

570-J. Flame Hardening Bulldozer Blades. *Welding Journal,* v. 30, Sept. 1951, p. 836.

Equipment and procedures of Seattle firm. (J2, ST)

571-K. Welded Tanks. *Welding Journal,* v. 30, Sept. 1951, p. 837-838.

Production by Baldwin-Lima-Hamilton Co. All welding is done by the electric-arc method. (K1, ST)

572-K. Largest Resistance Welder Installed at Ryan. *Welding Journal,* v. 30, Sept. 1951, p. 838-839.

Manufactured by the Federal Machine and Welding Co. of Warren, Ohio, to Ryan's specifications, the new machine can handle such heavy gages as two pieces of ⅛-in. thick Al alloy, or two pieces of 0.156-in. austenitic or Ni alloy, to an unusually great "throat" depth—60 in. (K3)

573-K. The Physical and Metallurgical Characteristics of Spot-Welded Titanium. M. L. Begeman, F. W. McBee, Jr., and J. C. Fontana. *Welding Journal,* v. 30, Sept. 1951, p. 429s-435s.

Properties and problems of spot welding commercially pure Ti. Optimum current timing and pressures; mechanical properties and microstructures of the welds. (K3, Ti)

574-K. Ice Flower-Like Structure in Metal Deposited by Arc Welding in Particular Mild Steel. Minoru Okada and Yoshikazu Wakabayashi. *Welding Journal,* v. 30, Sept. 1951, p. 469s, 472s.

Above structure is believed to be similar to micro-fissuring discussed in English welding literature. It is associated with and is found in close proximity to fisheyes when the latter appear in weld metal. From theoretical considerations, curves are drawn giving the relation of H_2 content of weld metal at 1800° K. for various ratios of CO/CO_2 and H_2O/H partial pressures and for various FeO contents at different temperatures. Experiments were made with small amounts of steel melted in an Al_2O_3 crucible and cast into a metal mold. Addition of 3% or more of iron oxide to the melt prevented formation of the ice-flower structure. Addition of a small amount of V also prevented it. (K9, M27, CN)

575-K. A Welded Exposition Building. M. Cosandey. *Welding Journal,* v. 30, Sept. 1951, p. 470s-471s. (Translated and condensed from *L'Ossature Metallique,* v. 16, 1951, p. 173-180; or *Bulletin Technique de la Suisse Romande,* No. 18, 1950.)

Arc welded steel and Al alloy structure at Lausanne, Switzerland. (K1, T25, Al, CN)

576-K. Semi-Automatic Welding Builds Tank Cars Faster. James S. Frey. *American Machinist,* v. 95, Oct. 1951, p. 170-171.

Construction of a 10,000-gal. aluminum tank, by gas-shielded arc welding. (K1, Al)

577-K. New Tools for Speed Welding. *Aviation Week,* v. 55, Oct. 8, 1951, p. 43, 45-46.

Giant resistance welding machines for handling large parts. A sequence timing panel was developed to cut "down time." (K3)

578-K. Why Shielded Arc Welding? H. E. Rockefeller. *Canadian Metals,* v. 14, Sept. 1951, p. 34-36, 38.

Applications of inert-gas-shielded-arc welding. A comparison is given between consumable and nonconsumable electrode methods of welding. (K1)

579-K. Measurement of Resistance of Welding Current. J. J. Ruley. *Industry & Welding,* v. 24, Oct. 1951, p. 48-50, 118-119.

Simple types of resistance-welding equipment, which contain control mechanisms. Applications. (K3)

580-K. Stored Energy for Stud Welding. *Industry & Welding,* v. 24, Oct. 1951, p. 68, 70, 72-73, 106-107.

A method of stud welding which eliminates need for flux, ceramic ferrules and special surface preparation and is easily adaptable to all types of metals and dissimilar metal combinations. (K1)

581-K. Welding Notebook. *Iron Age,* v. 168, Oct. 4, 1951, p. 234-235.

Practical welding ideas for the production and welding engineer. (K general, G22, L24)

582-K. The *Iron Age* Chart of Comparable Arcwelding Electrodes. *Iron Age,* v. 168, Oct. 4, 1951, p. 245-248.

Tabular data cover information on electrodes of corrosion resisting steel, copper, armor plate, mild steel, low alloy steel and aluminum. (K3, T5, ST, Cu, AY, Al)

583-K. How to Braze-Weld Cast Iron. *Linde Tips and Oxy-Acetylene Tips,* v. 30, Oct. 1951, p. 77-80. (K8, CI)

584-K. Brazed Assemblies for Cost Reduction. N. M. Salkover. *Magazine of Tooling and Production,* v. 17, Oct. 1951, p. 110, 112, 114-115.

Previously abstracted from *Steel.* See item 506-K, 1951. (K7, K8)

585-K. How to Join Nickel and High-Nickel Alloys by Resistance Welding. Robert M. Wilson, Jr. *Materials & Methods,* v. 34, Oct. 1951, p. 95-99.

Previously abstracted from *Welding Journal.* See item 509-K, 1951. (K3, K8, Ni)

586-K. Assembly by Brazing. L. Jacobsmeyer. *Metal Industry,* v. 79, Sept. 14, 1951, p. 215-219; Sept. 21, 1951, p. 244-245.

Suitability of the process for a varied range of applications. Advantages of brazing brass to steel, brass to brass, brass to stainless steels and stainless to stainless, using silver alloys. (K8, Cu, St, SS, Ag)

587-K. Joining Metals with Resin Adhesives. *Metal Progress,* v. 60, Sept. 1951, p. 128, 130. (Condensed from "The Bonding of Metals," C. J. Moss, *Metallurgia,* June 1951, p. 267-272.)

See abstract of "Bonding Rubber to Metal," *British Plastics;* item 134-K, 1951. (K11)

588-K. Simple Back-Up Device Facilitates Arc Welding of Box Sections. H. G. Frommer. *Modern Machine Shop,* v. 24, Oct. 1951, p. 234, 236, 238. (K1)

589-K. Rivets That Need No Bucking. *Modern Plastics,* v. 29, Oct. 1951, p. 100-102.

Latest developments of plastic rivets. Achievement of a permanent fastening without the necessity of bucking the rivet is made possible by the fact that the rivet is auto-

matically expanded from within when driven. They are injected molded in one piece from thermoplastic materials. They can be used to pin two or more sheets of metal, plastic or other materials. (K13)

590-K. Metallized Glass Components for TV. H. S. Craumer. *Television Engineering,* v. 2, Sept. 1951, p. 16-17, 23.

Metal-to-glass sealing techniques for bonding electrical conductors to excellent insulators such as glass permit a wide diversity of component designs. Production of such TV products as attenuator plates for microwaves, and ribbon capacitors and spiral inductances. (K11, T1)

591-K. Rolled Steel Machine Frames and Other Components Fabricated by Welding in Australia. John O. Ogden. *Welder,* v. 20, Jan.-June, 1951, p. 6-9.

Surveys and illustrations. Development of welding during the past decade. (K general, T26)

592-K. Welding of Copper and Its Alloys. (In French.) C. G. Keel. *Revue de la Soudure; Lastijdschrift,* v. 7, No. 2, 1951, p. 74-89.

Procedures and apparatus. Tables of alloy compositions suitable for welding, and samples of finished work. (K general, Cu)

593-K. Fatigue Strength of Welded Assemblies. Part II. (In French.) W. Soete and R. Van Crombrugge. *Revue de la Soudure; Lastijdschrift,* v. 7, No. 2, 1951, p. 90-97.

Rupture of welded structures (steel plates) with different weld designs were studied. Samples diagrammed and photographed. Data are tabulated and graphed. (K9, Q7)

594-K. Squeeze-Riveting. *Aircraft Production,* v. 13, Oct. 1951, p. 299-307.

Electro-hydraulic machine and equipment for fabrication of Bristol Type 175 wing-skin panels. (K13)

595-K. Automotive and Aircraft Sealers. *Automotive Industries,* v. 105, Oct. 1, 1951, p. 42-43, 108, 112, 114.

Applications of above materials to join metallic and nonmetallic components. (K12)

596-K. "Spot Cooling" Solves Tough Problem at 332 Welding Stations. Will D. Sampson. *Heating Piping & Air Conditioning,* v. 23, Oct. 1951, p. 100-101.

Air from a chemical dehumidifier is delivered through duct work to each of 332 welding stations in an industrial plant in the Gulf Coast area. The "spot cooling" thus provided has improved conditions and solved a number of problems. (K general, A5)

597-K. Ultrasonic Soldering of Light Metals. A. E. Crawford. *Metallurgia,* v. 44, Sept. 1951, p. 113-116, 121.

The use of ultrasonics for the purpose of erosion of the oxide film on the surface of Al and its alloys was studied. The advantages and limitations of the method, and details of equipment available for its application. (K7, Al)

598-K. The British Welding Research Association. K. Winterton. *Metallurgia,* v. 44, Sept. 1951, p. 133-136.

Continued advances being made in the welding of various metals, and attention given to the engineering aspects of welded construction. (K general, A9)

599-K. Joining Porous Metal Parts to Other Metals. H. W. Greenwood. *Metallurgia,* v. 44, Sept. 1951, p. 141-143.

The joining of porous metal parts made by powder metallurgy to similar parts and to nonporous metals, calls for the modification of accepted methods of joining. Methods used over a wide field, and conditions under which they have been found useful. (K general, H general)

600-K. Deep Welding—A New Method of Oxy-Acetylene Welding. R. Gunnert. *Metal Progress,* v. 60, Oct. 1951, p. 104-107.

Method is said to increase welding speed by 50% and lower the consumption of welding rod and gases. It introduces the flame deep into the gap, which is a butt joint, at right angles to its length. By this means the cone of the flame (and in particular its tip) is brought close to the root edges. Test welds were made on soft ST37 steel. (K2, CN)

601-K. Welding Characteristics of Two Austenitic Steels Used for Gas-Turbine Rotors. *Metal Progress,* v. 60, Oct. 1951, p. 170, 172, 174, 176, 180, 182. (Condensed from "Weld-Metal Properties and Welding Characteristics of Two Austenitic Steels Used for Gas-Turbine Rotors," E. Bishop and W. H. Bailey.)

Previously abstracted from *Iron and Steel Institute,* "Symposium on High-Temperature Steels and Alloys for Gas Turbines." See item 488-K, 1951. (K9, AY)

602-K. Explosion Deformation Tests of Weldments. *Metal Progress,* v. 60, Oct. 1951, p. 212, 214, 216. (Condensed from "Explosion Bulge Test Studies of the Deformation of Weldments," C. E. Hartbower and W. S. Pellini.)

Previously abstracted from *Welding Journal.* See item 394-K, 1951. (K9, ST)

603-K. A Review of Equipment Used in the Manufacture of Tin Boxes. (Continued). G. Taylor. *Sheet Metal Industries,* v. 28, Sept. 1951, p. 809-812; Oct. 1951, p. 907-908, 912.

The solder, flux, temperature, and setting factors to be considered in successful machine soldering. Design of body-making machines. Defects in such machines. (To be continued). (K7, Sn, CN)

604-K. Big Space Savings Realized in Brazed Aluminum Heat Exchangers. *Steel,* v. 129, Oct. 15, 1951, p. 80-82.

Production by Trane Co., La Crosse, Wis. Advantages. (K8, T27, Al)

605-K. Fabricated Gears and Gear Cases. *Welding & Metal Fabrication,* v. 19, Sept. 1951, p. 330-334; Oct. 1951, p. 392-396.

Equipment and procedures employed for flame cutting, preforming, and gas and arc welding. Material fabricated includes bronze gear rims to steel and cast iron, also different types of alloy steels and stainless steels. (K1, K2, G22, T7, Cu, Fe, AY, SS)

606-K. The Construction of Australia's Largest Water Pipeline. D. Cooke. *Welding & Metal Fabrication,* v. 19, Oct. 1951, p. 374-378.

Welding and other procedures used. (K general, CN)

607-K. Metal Crate Production. *Welding & Metal Fabrication,* v. 19, Oct. 1951, p. 379-382.

Production of the above by a British firm. Gas welding is used to join the steel parts. (K2, CN)

608-K. The E. S. S. Welding Process. H. O. Willrich. *Welding & Metal Fabrication,* v. 19, Oct. 1951, p. 383-385.

Semi-automatic process developed by Siemens-Schuckert is a combination of the Elin-Hafergut and Unionmelt processes. (To be continued.) (K1)

609-K. Resistance Welding Light Alloys. R. Bushell. *Welding & Metal Fabrication,* v. 19, Oct. 1951, p. 387-389, 396.

Recommended procedures and equipment. Information is concerned only with Al and its alloys. (K3, Al)

610-K. Stud Welding on Aluminium Alloys. D. C. G. Lees. *Welding & Metal Fabrication,* v. 19, Oct. 1951, p. 390-391.

Tests made on some Al-Mg alloys of particular interest in marine construction. (K1, Al)

611-K. Welding Equipment Maintenance. T. B. Jefferson. *Welding Engineer,* v. 36, Oct. 1951, p. 33.

Stresses the need for proper care of welding tools. (K general)

612-K. Preventive Maintenance for Resistance-Welding Equipment. *Welding Engineer,* v. 36, Oct. 1951, p. 38-41.

How checks at regular inspection periods will find weaknesses in resistance welders before they can lead to breakdowns. (K3)

613-K. How to Prevent Arc Welder Troubles. *Welding Engineer,* v. 36, Oct. 1951, p. 34-36.

How to set up a systematic maintenance program. Hints on service records, lubricating and proper inspection. (K1)

614-K. Welding at War. *Welding Engineer,* v. 36, Oct. 1951, p. 51-53.

Welding practices being carried on in Korea in the maintenance of military equipment. (K general, T2)

615-K. Inert-Gas-Shielded Metal-Arc Welding of Magnesium. Paul Klain. *Welding Journal,* v. 30, Oct. 1951, p. 887-893.

The experimental work was limited to the Mg alloy FS1 (3 Al, 1 Zn) and to the use of one type of commercially available manual welding equipment (Aircomatic, Model 3). Arc characteristics, mechanical properties, and soundness of welds obtained on Mg by the use of the metal-arc process were studied. (K1, Mg)

616-K. A Case of Power. Jerry Geralds, Paul Duker, and Myron Zucker. *Welding Journal,* v. 30, Oct. 1951, p. 894-902.

Power-supply problems from the viewpoint of management. Shows the importance of machine setup and operating practices in selecting a power supply for welders; and how "thinking-before-doing" can produce an adequate system at moderate cost, under difficult conditions. (K1)

617-K. Aircomatic Welding of Austenitic Stainless Steels. W. G. Benz, Jr., and J. S. Sohn. *Welding Journal,* v. 30, Oct. 1951, p. 911-926.

Presents results of an investigation of the mechanical properties and resistance to corrosion of austenitic Cr-Ni grades of stainless steel weld metal and welded joints deposited with the inert-gas-shielded metal-arc process. 14 ref. (K1, R general, Q general, SS)

618-K. Aircomatic Welding Refinery Components and Pressure Vessels. Stephen A. Yaczko. *Welding Journal,* v. 30. Oct. 1951, p. 903-907.

Procedures for welding stainless, stainless-clad steel, low-alloy steel, and Cu-alloy pressure vessels by the Aircomatic welding process. (K1, SS, AY, Cu)

619-K. High-Temperature Welded Joints. R. H. English. *Welding Journal,* v. 30, Oct. 1951, p. 907-910.

Common types of high-alloy castings used for high-temperature

work, and welding procedures (mainly shielded metal-arc process) for their fabrication. Types discussed are the HH (25 Cr, 12 Ni), the HK (25 Cr, 20 Ni), and the HT (15 Cr, 35 Ni). (K1, SS, SG-h)

620-K. Pressure Welding Aluminum at Various Temperatures. Mike A. Miller and Glenn W. Oyler. *Welding Journal,* v. 30, Oct. 1951, p. 486s-498s.

Major factors in pressure welding of Al are temperature, pressure, and time. Advantages and disadvantages of using low temperatures and high unit pressures, as contrasted to the use of elevated temperatures and low unit pressures. Applications for pressure welding of Al. (K2, Al)

621-K. Investigation of Factors Which Determine the Performance of Weldments. C. E. Hartbower and W. S. Pellini. *Welding Journal,* v. 30, Oct. 1951, p. 499s-511s.

The explosion bulge technique was applied to study of the fracture performance of ¾-in. thick butt weldments and unwelded plate. Two steel representatives of high-tensile and mild steel grades were investigated. The deformation characteristics of the various weld and base-metal combinations were studied together with their flow strengths and Charpy V-notch transitions in an attempt to determine the basic factors controlling weld performance. (K9, Q26, ST)

622-K. Tensile Tests and Metallurgical Studies of Welded Copper Joints. R. J. Mosborg, R. W. Bohl, F. W. Howland, and W. H. Munse. *Welding Journal,* v. 30, Oct. 1951, p. 519s-528s.

Investigation at various temperatures and by different welding processes. (K general, Q27, Cu)

623-K. (Book) **Das Schweissen im Schiffbau.** (Welding in Ship Construction.) K. Krekeler. 43 pages. 1950. W. Girardet, Essen, Germany.

Reviews the present status and prospects of German ship construction. Advantages of welding over riveting; design and material of welded parts; welding methods for structural and machine parts, including steam turbines and diesel engines. 21 ref. (K general T22, ST)

624-K. Welded Store Requires Less Steel. J. B. McCormick. *Engineering News-Record,* v. 147, Oct. 18, 1951, p. 51.

(K general, T26)

625-K. Equipment and Design. Charles Owen Brown. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 93A-94A, 96A.

Details in the welding of light and corrosion resistant metals. (K general, SS)

626-K. The Flow of Liquid Metals on Solid Metal Surfaces and Its Relation to Soldering, Brazing, and Hot-Dip Coating. G. L. J. Bailey and H. C. Watkins. *Journal of the Institute of Metals,* v. 80, Oct. 1951, p. 57-76.

Earlier investigations of soldering performance. Theory of factors controlling flow of liquids on solid surfaces. Experimental investigations of the behavior of several liquid metals and alloys in contact with various solid metals. The production of particularly low contact angles between Pb and Fe or Cu and between Sn and Cu, through very small additions to the Pb or Sn. 19 ref. (K7, K8, L16, Pb, Fe, Cu, Sn, SG-f)

627-K. Use of a Photo-Electic Cell for Accurate Work Location for Riveting Operations. H. L. Hubbard. *Machinery* (London), v. 79, Oct. 4, 1951, p. 587-588.

Method and equipment used at the Torrance, Calif., plant of North American Aviation. (K13)

628-K. Brazed Aluminum Heat Exchangers. *Modern Metals,* v. 7, Oct. 1951, p. 25-28.

New process developed by Trane Co., LaCrosse, Wis. (K8, Al)

629-K. The Cost Picture of Shielded Arc Welding. H. E. Rockefeller. *Canadian Metals,* v. 14, Oct. 1951, p. 36-38.

Cost comparison between Heliarc and sigma welding for copper alloys, stainless, and carbon steels. Advantages and applications of each process. (K1, Al, Cu, CN, SS)

630-K. Investigation of the Adherence of Glass to Metals and Alloys. R. C. Dartnell, H. V. Fairbanks, and W. A. Koehler. *Journal of the American Ceramic Society,* v. 34, Nov. 1951, p. 357-360.

Commercially pure metals, composed of one phase, and alloys, composed of two phases, were investigated. The effect of heat treatment of a modified brass sample as well as the effect of increasing the percentage of carbon in iron was investigated with respect to adherence temperatures. The samples with high adherence temperatures were investigated with respect to persistence, using amber and clear soda-lime glass. (K11, Fe, Cu)

631-K. Silver Brazing Single Handle Mixing Faucets. Howard E. Jackson. *Modern Machine Shop,* v. 24, Nov. 1951, p. 206-208, 210, 212, 214.

Procedures and techniques. Parts are made from wrought brass and stainless steel. (K8, Cu, SS)

632-K. Automatic Welding on the Right-of-Way Applied on Service Pipe Line Project. Paul Reed. *Oil and Gas Journal,* v. 50, Nov. 1, 1951, p. 72.

Methods and techniques employed. (K1, CN)

633-K. Welding Inconel "W" Sheet. Allan J. Rosenberg. *Steel,* v. 129, Nov. 5, 1951, p. 99-102.

How this Ni-base alloy can be successfully welded by inert-arc, metal-arc, and resistance welding processes. While direct aging is satisfactory for short-time properties, annealing prior to aging increases 100-hr. stress-rupture values. For optimum resistance welding conditions, high unit pressures and slow weld cooling should be utilized. Filler material is advisable for best inert-arc-welded joint strengths.
(K1, K3, Q general, Ni)

634-K. Welding Repair of Forging Equipment. James M. Wilson. *Steel Processing,* v. 37, Oct. 1951, p. 501-504, 533.

Application of Thermit welding for repair and fabrication of heavy parts. Set-up for a typical weld. (K4)

635-K. New Wrinkles in Heat Exchangers. Clyde B. Clason. *Welding Engineer,* v. 36, Nov. 1951, p. 33-35.

Corrugated Al heat exchangers and their production by Trane Co., La Crosse, Wis. Emphasis is on the new brazing process used. (K8, T5, Al)

636-K. All-Welded Framework in New Department Store. Fred M. Burt. *Welding Engineer,* v. 36, Nov. 1951, p. 36-38, 41.

See abstract of "Welded Robinson Structure Permits 15% Steel Saving", *Western Metals;* item 546-K, 1951. (K1, T26, CN)

637-K. Titanium Is Weldable. Thomas A. Dickinson. *Welding Engineer,* v. 36, Nov. 1951, p. 39-41.

Welding processes and equipment used. Mechanical properties of the welds are charted, tabulated, and discussed. Welding of Ti to other metals is not yet feasible.
(K general, Ti)

638-K. Microwave. Sam Kaplan. *Welding Engineer,* v. 36, Nov. 1951, p. 42-44.

Giant Al screens used in microwave radio and television transmission, and their fabrication by inert-arc welding. (K1, T1, Al)

639-K. What You Should Know About Welding. W. C. Mearns. *Welding Engineer,* v. 36, Nov. 1951, p. 45-47.

Recommendations applying to all forms. Results of experimental installations of arc-welded centrifugally-cast ductile-iron pipe.
(K general, K1, CI)

640-K. Faster Production by Stud Welding. *Welding Engineer,* v. 36, Nov. 1951, p. 51.

Application to fabrication of large power and steam-generating equipment by Combustion Engineering Superheater, Inc., East Chicago, Ind. (K1, CN)

641-K. Ways to Weld Magnesium Alloys. R. L. Nelson and I. C. Mattson. *Welding Engineer,* v. 36, Nov. 1951, p. 52-56.

Recommended procedures and their application to miscellaneous products. (K general, Mg)

642-K. Thermit Helps Texas Drilling. Jack I. Medoff. *Welding Engineer,* v. 36, Nov. 1951, p. 58-60.

How thermit welding is being applied in the Texas oil fields to repair drill stems and drill collars. (K4, ST)

643-K. Byron Jackson Uses Welded Fabrication for Increased Flexibility of Design; Improved Product Reliability; Reduction in Costs. F. R. Drahos. *Western Metals,* v. 9, Oct. 1951, p. 23-25.

Filler-rod material; joint design; welding procedure; operator ability; and the physical, chemical and thermal characteristics of the material or materials used. (K1)

644-K. Induction Brazing of Large Rotors. P. H. Brace and E. B. Fitzgerald. *Westinghouse Engineer,* v. 11. Nov. 1951, p. 184-185.

Process offers advantages of rapid and hence concentrated heating, uniformity, speed, and automatic control. The job consists of brazing each of many closely spaced copper bars into a copper short-circuiting ring. (K8, Cu)

645-K. Construction of Metal Containers by Electric Spot-Welding System. (In French.) A. Klopfert. *L'Ossature Métallique,* v. 16, Oct. 1951, p. 485-488.

Design and construction of large steel boxes for railway transportation of merchandise. (K3, CN)

646-K. Light Metal Davits Welded in an Argon Atmosphere. (In French.) Charles Guinard and Pierre Vidal. *Revue de l'Aluminium,* v. 28, July-Aug. 1951, p. 290-294.

Davits constructed by two different firms, one using the Nertalic semi-automatic process with the feed metal electrode, the other the tungsten-electrode process, both in an atmosphere of argon. The two davits showed performances similar to those of welded steel structures, with a weight saving of about 50%.
(K1, T26, Al)

647-K. The Properties of Arc Welding Electrodes With Basic Coatings. (In French.) Daniel Seferian. *Revue de Métallurgie,* v. 48, Aug. 1951, p. 579-597; disc., p. 597.

Experimental details and theoretical evaluation, such as study of slag-metal equilibria, of structure

and mechanical properties of welds in carbon steel made with basic electrodes. 35 ref. (K1, CN)

648-K. How to Measure Voltages and Currents in Electric Arc Welding. (In French.) A. Gaubert. *Soudure et Techniques connexes,* v. 5, July-Aug. 1951, p. 145-155; disc., p. 155-156.

Electromagnetic measuring device constructed for above in industrial as well as laboratory use. (K1)

649-K. Applications of Welding in Construction of Metallurgical Equipment. (In French.) P. Levivier. *Soudure et Techniques connexes,* v. 5, July-Aug. 1951, p. 159-163; disc., p. 163-165.

Construction of welded blast furnaces. (K general, T5, CN)

650-K. Electric Arc Welding in a Gaseous Medium. (In French.) *Soudure et Techniques connexes,* v. 5, July-Aug. 1951, p. 179-181.

Reviews the literature. 26 ref. (K1)

651-K. Flaw Formation in Welds. (In German.) Walter Eilender, Heinrich Arend and Werner Neuhaus. *Archiv für das Eisenhüttenwessen,* v. 22, July-Aug. 1951, p. 261-263.

The cause of circular or oval height flaws (fisheyes) on the fracture surface of welds in steels, especially Cr-Ni steels. Results show that the number of fisheyes can be reduced by proper welding conditions and eliminated by subsequent heat treatment. (K9, ST)

652-K. Light-Metal Welding in Apparatus Construction. (In German.) A. Matting. *Metall,* v. 5, Oct. 1951, p. 429-434.

Weldability of the most important Al alloys, the problem of weld cracking, corrosion resistance, and the most important welding methods. (K general, R general, Al)

653-K. Research on Welding With "Deep-Burning" Electrodes. (In German.) A. Buchholz. *Schweissen und Schneiden,* v. 3, Aug. 1951, p. 233-237.

Use for welding of steel was found to result in considerable advantage, although the operation requires somewhat more skill. (K1, ST)

654-K. The Kaell Welding Process. (In German.) Fr. Bischof. *Schweissen und Schneiden,* v. 3, Ag. 1951, p. 248-252.

Process using coated double electrodes for welding of steel. Compositions of the electrodes and the coating; equipment. Comparative results with this method and with hand welding are tabulated and illustrated by micrographs and macrographs. (K1, ST)

655-K. Cast-Iron Welding. (In German.) Viktor Walter. *Schweisstechnik,* v. 5, May 1951, p. 56-57; June 1951, p. 68-69.

Avoiding shrinkage stresses by slow preheating of cast iron parts. These stresses can also be counteracted by applying an equal but opposite stress. (K general, CI)

656-K. Effect of Hot Working on Aging Tendency of Submerged-Melt Welds. (In German.) *Schweisstechnik,* v. 5, June 1951, p. 64-68.

Experiments showed that the aging tendency of welds in steel is reduced by hot working. Effect of degree of working on notch toughness was investigated. Mechanical properties resulting from different types of heat treatment were studied and compared. (K1, Q general, CN)

657-K. Cold Shortness in the Welding of High Quality Steels. (In German.) W. Hummitzsch. *Schweisstechnik,* v. 5, July-Aug. 1951, p. 88-91.

Directions for the prevention of cold shortness. Experiments were made on several low-alloy Cr-Ni-Mo steels. Reheating is recommended when the welding process causes the weld bead to contain considerable amounts of hydrogen. (K general, Q23, AY)

658-K. Filler Materials Used in Welding Unalloyed and Low-Alloy Steels. (In German.) Werner Hummitzsch and Franz Rapatz. *Stahl und Eisen,* v. 71, Aug. 30, 1951, p. 925-940; disc., p. 940.

Welding rods, welding procedures, and mechanical properties of welds in several steels. 36 ref. (K1, K2, T5, CN, AY)

659-K. Progress in Thermit Welding. (In German.) Wilhelm Ahlert. *Werkstoff und Korrosion,* v. 2, Aug., 1951, p. 292-296.

Chemical and thermochemical principles of the thermit process. New developments in technology and applications in connection with welding of steel. (K4, ST)

660-K. Welding Light Metals. (In German.) P. Brenner. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, Aug. 1, 1951, p. 729-735.

Light metals are more and more frequently being welded under protective gas shielding. Comparative data for welding of Al and its alloys illustrate the relative strength properties of welds. Weld design. 15 ref. (K1, Al)

661-K. Welding for Die Repair. Ed Brenner and Ernest Smith. *Industry & Welding,* v. 24, Nov. 1951, p. 31-32, 34.

Procedures carried on at Willys-Overland Motors, Inc., Toledo. Equipment and materials. Applications to gray-iron alloy cast structures, heat treatable steels, and hot-forged dies. (K general, T5, CI, ST)

662-K. Measurement of Electrode Force on Resistance Welding Machines. J. J. Riley. *Industry & Welding,* v. 24, Nov. 1951, p. 40, 42.

Measurement of electrode force to insure that adequate force is exerted and maintained on the weld being made. (K3)

663-K. Newer Techniques, Latest Methods for Torch Brazing Aluminum. *Industry & Welding,* v. 24, Nov. 1951, p. 44-45, 47, 76-77.

Includes design, cleaning, and flux removal. (K8, L12, Al)

664-K. Intelligent Integration of Men and Machines Combined With Engineering and Management Know-How Results in High Quality Production. *Industry & Welding,* v. 24, Nov. 1951, p. 48-50, 52, 67.

How practices at Steel and Alloy Tank Co. result in the production of complicated weldments, pressure vessels and towers of mild steel, stainless steel, nickel, Monel, Inconel, chromium steel and heavy clad steels.
(K general, T26, CN, SS, Ni, Cr, ST)

665-K. Resistance Soldering Increases Valve Production 25 Per Cent. *Industry & Welding,* v. 24, Nov. 1951, p. 55-57.

How resistance soldering joins Cu tubing to cast brass valve bodies without annealing. (K7, Cu)

666-K. Manual vs. Automatic Welding. Bernard J. Smolka and Herbert Gefvert. *Industry & Welding,* v. 24, Nov. 1951, p. 59-60.

As applied to the fabrication of basic motor-frame rings at Reliance Electric & Engr. Co., Cleveland. Cost analysis is given. (K1)

667-K. Adhesives in Machine Design. John Delmonte. *Machine Design,* v. 23, Nov. 1951, p. 96-101, 192.

Adhesive selection, properties, and compositions as well as application to a variety of bonding problems in construction of assemblies. Includes rubber-metal, plastic-metal, and metal-metal joining. (K12, K11)

668-K. Metal Stitching Speeds Assembly, Reduces Cost. Part I. Arthur G. Denne. *Tool Engineer,* v. 27, Nov. 1951, p. 40-42.

Advantages of this type of joining over other methods. Cost data are presented. (To be continued.) (K13)

669-K. Recent Advances in the Technique of Electric Spot Welding of Aluminium Alloys in the French Aircraft Industry. J. Faguet. *Transactions of the Institute of Welding,* v. 14, Aug. 1951, p. 110-120.

The results obtained, methods by which they have been achieved, current-control methods, and reliability of the various methods of welding; also some applications to the welding of aircraft components subject to heavy stresses. (K3, Al)

670-K. British Experience in the Argon Arc Welding of Aluminium. W. V. Binstead and E. G. West. *Transactions of the Institute of Welding,* v. 14, Aug. 1951, p. 121-139.

The process and equipment available in Britain; typical applications of the process; some of the problems requiring further investigation. 38 ref. (K1, Al)

671-K. Recent French Studies on the Weldability of Aluminium-Magnesium Alloys. J. Herenguel and M. Hollard. *Transactions of the Institute of Welding,* v. 14, Aug. 1951, p. 140-144. (Translated from the French.)

The general problem, the phenomenon of blistering, and crack sensitivity of welds in Al-Mg alloys. The alloys involved contain mainly Al. (K9, Al)

672-K. Developing a Weldable High Tensile Steel From 18-Lb. H. F. Melts. *Welding Research,* v. 5, June 1951, p. 189r-196r.

Preliminary work of the FM.8 Committee of the British Welding Research Assn. in their effort to develop a weldable high-tensile steel having a 0.2% proof stress of 30 tons per sq. in. The possibility of an 18-lb. high-frequency induction furnace melt providing sufficient material for a modification of the Reeve fillet-weld cracking test. The determination of weldability, steelmaking technique, and examination of mechanical properties of the steels were standardized by using one steel from the proposed range of compositions to determine a satisfactory procedure.
(K9, Q general, CN)

673-K. Control of Cracking in Arc Welding High Tensile Structural Steels. C. L. M. Cottrell, M. D. Jackson, and J. G. Whitman. *Welding Research,* v. 5, Aug. 1951, p. 201r-215r.

Problem of welding a prefabricated bridging structure in a high-tensile structural steel. The structure was fabricated from low-alloy high-tensile steel rolled sections and plates using the a.c. metallic-arc process. All relevant data were recorded for each joint. The joints were afterwards sectioned and examined for presence or absence of cracks, and in this way it was possible to determine the minimum requirements to insure crack-free welds. (K3, K9, CN)

674-K. (Book) Electronic Motor and Welder Controls. George M. Chute. 348 pages. 1951. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $6.50.

Welding controls of the most modern types and various commercial apparatus. (K1, K3)

SECTION L

CLEANING, COATING and FINISHING

1-L. Westinghouse Reports High Durability for Mica Based Paint System. J. G. Ford and A. J. Kuti. *Paint, Oil & Chemical Review,* v. 113, Dec. 21, 1950, p. 12, 14, 24, 26-27.

See abstract of "Mica-Base Paint System Doubles Transformer Tank Life", *Steel,* item 753-L, 1950. (L26, ST)

2-L. Kaiser Employs World's Largest Electric Furnace in Quality Porcelain Enameling of Sinks and Bathtubs. Warren Walker, Jr. *Instrumentation,* v. 5, 4th qtr., 1950, p. 22-23.

The process, including the control system. (L27, CN)

3-L. Liquid Flux Technique Reduces Dross Formation. Wallace G. Imhoff. *Steel,* v. 127, Dec. 25, 1950, p. 62, 64.

Coating surface of work in transit between pickling and galvanizing departments with zinc ammonium chloride protects against iron corrosion and minimizes production of dross which accumulates in the bottom of galvanizing pots. (L16, Zn, ST)

4-L. Wire Brushing No Longer Required For Painting of Rusty Roofs. Carlton C. Porter. *American Paint Journal,* v. 35, Dec. 25, 1950, p. 56, 58.

Results of field tests prove that one coat of Zn-pigment paint gives good protection against rust if loose scale is removed with a stiff brush from galvanized roofs. (L26, Zn, CN)

5-L. Time, Labor, and Materials Saved by Hot Spraying Industrial Organic Finishes. Leon M. Jaroff. *Materials & Methods,* v. 32, Dec. 1950, p. 54-56.

Procedures and equipment. Results of comparative tests on lacquer and enamel. Technological and economic advantages. (L26)

6-L. Conservation of Nickel Salts in the Vitreous Enameling Industry. Jason M. Zander. *Better Enameling,* v. 21, Dec. 1950, p. 6-7. (L27)

7-L. Some Test Results From an Industry-Wide Research Program. F. A. Petersen. *Better Enameling,* v. 21, Dec. 1950, p. 16-19.

Results of work on standard test methods done by the Dept. of Ceramic Engineering, University of Illinois, for Enamel Utensil Manufacturers' Council since 1940. Tests developed or improved were for enamel thickness, impact resistance, thermal shock resistance, resistance to food acids, and wear resistance. (L27, Q general, CN)

8-L. Hard Facing of Steam Valve Seats and Disks. Oscar E. Swenson. *Welding Journal,* v. 29, Dec. 1950, p. 1053-1058.

General welding procedure, fundamental differences in heating effects of low, medium, and high velocity tips and evaluation of devices employed at U. S. Naval Engineering Experiment Station. Different overlay compositions, such as Cr-Ni-B, Cr-Co-Ni-Mo, and Co-Cr-W may be interchanged when flame ratios and deposition conditions are controlled. (L24, T7, SG-m)

9-L. New Production Applications of Hard Facing. E. C. Hurt. *Welding Journal,* v. 29, Dec. 1950, p. 1082-1086.

Several applications and advantages of inert-gas shielded-arc welding. (L24, K1, SG-m)

10-L. Painting Auto Heaters on a Mass Production Basis. William Mattie. *Industrial Finishing,* v. 27, Dec. 1950, p. 28-30, 32, 34, 36, 38.

Equipment and procedures at Eaton Mfg. Co. Includes precleaning of metal, dip coating, electrostatic spray painting, and infrared baking. (L26)

11-L. Developments in Internal Pipe Coating Techniques. J. K. Alfred. *Pipe Line News,* v. 22, Dec. 1950, p. 22-25.

Relative merits of three methods: plastic lining applied in place; cement lining applied in the mill or

local plant; and cement lining applied in place. Each is designed to prevent corrosion by crude oil or petroleum products. (L26, CN)

12-L. New Developments in Coatings and Cathodic Protection. Carlton L. Goodwin. *Pipe Line News,* v. 22, Dec. 1950, p. 32-34.

Concerned principally with petroleum and products pipe lines. (L26, R10, CN)

13-L. Anti-Corrosive Compositions; Results of B.I.S.R.A. Research on Underwater Service on Steel. *Paint Manufacture,* v. 20, Dec. 1950, p. 439-442.

Extracts from first report of BISRA committee. (L26, R4, ST)

14-L. Mould Cleaning by the Vapour Blast Process. E. J. Gooding. *Journal of the Society of Glass Technology.* (Transactions Section), v. 34, June 1950, p. 101-107.

Vapor-blast process for cleaning molds for glassware. A mixture of fine abrasive material and water is fed at high velocity from an injector nozzle against the mold surface. (L10, CI)

15-L. Anti - Corrosive Pigments. *Chemical Age,* v. 63, Dec. 2, 1950, p. 772.

Recent German, British, and U. S. work on pigments consisting of inert particles coated with anti-corrosive coloring agents. (L26)

16-L. New Plating Shop; Chippenham Works of the Westinghouse Brake and Signal Co. *Metal Industry,* v. 77, Dec. 8, 1950, p. 259-261. (L17)

17-L. Galvanizing High-Carbon Steel. (In German.) *Metalloberfläche,* sec. B, v. 2, Nov. 1950, p. 166.

Methods and precautions to be observed in treatment of steels (more than 0.35% C) to be electroplated. (L16, CN, Zn)

18-L. Gray Iron; Malleable; Steel: Galvanizing Characteristics. Robert W. Sandelin. *American Foundryman,* v. 18, Dec. 1950, p. 64-67.

Investigation of appearance, thickness, weight, and weight loss on immersion in molten Zn, for galvanized specimens of 2 gray cast irons, 2 malleable irons, and 6 steels. (L16, Zn)

19-L. The Fabrication of Magnesium Assemblies. Part II. Surface Protection of Magnesium. J. S. Kirkpatrick. *Modern Metals,* v. 6, Dec. 1950, p. 36-38.

Surface protection techniques and preparations employed at Brooks and Perkins. (Concluded.) (L general, Mg)

20-L. The Chemical Silvering of Non-Metallic Surfaces. C. F. Drake. *Research,* v. 3, Dec. 1950, p. 582-583.

Effects of nonionic, anionic, and cationic surface-active agents on the above. (L14, Ag)

21-L. Finishing California License Plates. Fred M. Burt. *Organic Finishing,* v. 11, Dec. 1950, p. 7-10.

Equipment and procedures at Folsom State Prison. Cold rolled steel is cleaned, phosphated, given two dip coats with baking after each dip. Letters and numerals are likewise given two coats by roller coating. (L26, CN)

22-L. Notes on the Selection and Handling of Trichlorethylene Degreasing Plants. *Electroplating and Metal Finishing,* v. 3, Nov. 1950, p. 560-564; Dec. 1950, p. 614-617.

Advantages and disadvantages of the various types of trichlorethylene degreasing plants available to the metal finisher. (L12)

23-L. Stainless Steel Surfacing. F. G. Lang. *Industry & Welding,* v. 24, Jan. 1951, p. 28.

Procedure for re-surfacing turbine buckets and blades. (L24, SS)

24-L. Maybe There's a Use You Can Find for Vapor Welding. Thomas A. Dickinson. *Welding Engineer,* v. 36, Jan. 1951, p. 34-36.

The vapor-deposition process for metallizing. Equipment and procedures; applications and advantages. (L25)

25-L. High Temperature Resistant Ceramic Coatings for Iron, Steel and Alloy Metals. Dwight G. Bennett. *Finish,* v. 8, Jan. 1951, p. 31-35, 52-53; *Better Enameling,* v. 22, Jan. 1951, p. 11-15, 22-23, 26-28.

Results from various organizations. Typical data and test equipment. (L27, Fe, ST, SS)

26-L. Coordination of Fabrication and Cleaning Means Money in the Bank. G. A. Cairns. *Finish,* v. 8, Jan. 1951, p. 27-28, 53, 56.

Drawing lubricants and cleaning materials and solutions of common cleaning problems applicable to steel to be porcelain enameled. (L12, G21, CN)

27-L. How Buick Cuts Forging Cleaning Cost. Herbert Chase. *Steel,* v. 128, Jan. 8, 1951, p. 60-61.

New conveyor-fed blasting system at the Flint, Mich., forge shop uses cut wire shot to clean 12 tons of small forgings per hour. (L10, ST)

28-L. Molybdenum Plating—Answer to Lower Cost Metals for High Temperature Service? *Steel,* v. 128, Jan. 8, 1951, p. 62-64. (Based on "Molybdenum Plating by Reduction of the Pentachloride Vapor," W. J. Childs, J. E. Cline, W. M. Zisner, and John Wulff.

Previously abstracted from *Amer-*

ican Society for Metals, Preprint No. 8, 1950. See item 742-L, 1950. (L25, Mo, Ni, CN)

29-L. A Review of Developments in Metal Decorating. Christian F. Scheehle, Jr. *National Lithographer,* v. 57, Dec. 1950, p. 28-29, 80-82.

Developments in equipment and procedures. (L26)

30-L. Synthetics Have Taken Over. E. C. Haskell. *National Lithographer,* v. 57, Dec. 1950, p. 30-31.

Use of synthetic resins for metal coating and decorating. (L26)

31-L. Tin Plate for the Metal Decorator. George F. Buckle. *National Lithographer,* v. 57, Dec. 1950, p. 32-33, 75, 77.

Short history of the making of tin plate and an insight into some new developments. (L17, Sn, ST)

32-L. Inks for Metal Decorating. William E. Traub. *National Lithographer,* v. 57, Dec. 1950, p. 34, 77-79. (L26)

33-L. For Metal Decorating Better Plates Are Here. Michael H. Bruno. *National Lithographer,* v. 57, Dec. 1950, p. 36-37, 83, 91-92.

The various types of plates now available to the metal decorator. (L26, L17)

34-L. Report on the Use of Electrolytic Tin Plate in Lithographic Work. *National Lithographer,* v. 57, Dec. 1950, p. 38-39, 79-80.

Research on methods of producing better adhesion of organic topcoats to various tinplate surfaces. Use of resinous coatings of various types. (L26, L17, Sn)

35-L. Metal Decorating Research and Development. John K. Rasmussen. *Modern Lithography,* v. 18, Nov. 1950, p. 63-65, 94; Dec. 1950, p. 47-49.

Some lithographing problems. How to test for adhesion and for the quality of coating materials. New types of equipment and lithographic plates. (L26)

36-L. An Australian Looks at U. S. Plating. J. J. Dale. *Plating,* v. 38, Jan. 1951, p. 58-59. (L17)

37-L. Plating to Specification. *Plating Notes,* v. 2, Oct. 1950, p. 152-160.

Transcript of discussion held by the Melbourne branch of the American Electroplaters' Society Aug. 17, 1950. (L17)

38-L. Bonderizing for Wire Drawing Installation at Frederick Smith & Co., Wire Manufacturers, Ltd. *Wire Industry,* v. 17, Dec. 1950, p. 970. (L14, ST)

39-L. Metal on Metal. R. H. Warring. *Machinery Lloyd* (Overseas Edition), v. 22, Dec. 9, 1950, p. 91-93.

Methods for application of various metallic coatings to metallic bases. (L general)

40-L. Hard-Facing by Spray Welding. L. A. Holtgren and R. E. Parker. *Welding,* v. 18, Dec. 1950, p. 523-528.

Technique developed for hard facing special stainless steels which cannot be hard faced satisfactorily by normal procedures. Hard facing powder is sprayed onto the component and then fused by an oxy-acetylene torch. (L24, SS)

41-L. Research on Sprayed Metal Coatings. (In German.) Hans v. Hofe, Wilhelm Hofmann, and Günther Suchan. *Abhandlungen der Braunschweigischen Wissenschraftlichen Gesellschaft,* v. 2, 1950, p. 175-184.

Metal was sprayed onto a steel shaft and the latter cut into cylindrical samples. By annealing the disks in hydrogen and in a vacuum between 900 and 1200° C., diffusion between the base steel and the coating was caused to take place. By this means, resistance to tension and shear was increased. Two steel disks were sprayed with brass and their brass sides placed in contact. These "double" samples were compressed in an Amsler machine and amount of compression measured. From these data, and similar ones for uncoated steel, elastic and plastic compression of the layer was determined. Cast iron, sintered iron, and sprayed steel were studied in a similar manner. (L23, ST, CI, Fe, Cu)

42-L. "Alubril": A New Process Developed by I. S. M. L. for Chemical Polishing of Aluminum. (In Italian.) *Alluminio,* v. 19, No. 5, 1950, p. 437-449.

Method developed by the Italian Research Institute for Light Metals. Composition; chemistry of the reactions which take place; optimum conditions of operation; preliminary treatment of the objects to be polished; and applications. (L12, Al)

43-L. Abrasive-Liquid Finishing of the Surfaces of Machine Parts and Tools. (In Russian.) Sh. M. Bilik. *Stanki i Instrument,* (Machine Tools and Equipment), v. 21, Sept. 1950, p. 9-13.

Use of abrasive-liquid blasting. Different types of equipment. Of particular interest is the addition of certain chemical agents to the liquid in order to increase the corrosion resistance of treated parts. (L10, ST)

44-L. Study on the Application of Material. III. On the Mechanization of Solid Cementation and the Function of Carburizers. (In Japanese.)

Hisao Matsumoto. *Journal of Mechanical Laboratory,* v. 4, Jan. 1950, p. 21-27.

Results of experimental and theoretical investigation. Ideal equations of solid-state cementation are derived from diffusion theory and verified experimentally. (L15, J28)

45-L. Aluminum Bright Dip Process Gives Low Cost Reflectivity. F. H. Hesch and C. A. Rosellen. *Western Metals,* v. 8, Dec. 1950, p. 19-20.

Process developed by Kaiser Aluminum and Chemical Corp. can be be used on all aluminum alloys, but the most satisfactory brightening can be obtained on 2S, 3S, 52S, 61S, 150S, and high purity Al as well as on the clad forms of 24S and 75S. Applications are summarized. (L16, Al)

46-L. New Methods Reduce Costs of Polishing Die Castings. Joseph Geschelin. *Automotive Industries,* v. 104, Jan. 1, 1951, p. 49, 62.

Some new mechanical methods used at Ternstedt Div., General Motors Corp., for Zn-alloy automotive hardware castings. (L10, Zn)

47-L. The Structure of Metal Deposits Obtained by Electrochemical Displacement Upon Zinc. M. E. Straumanis and C. C. Fang. *Journal of the Electrochemical Society,* v. 98, Jan. 1951, p. 9-13.

An attempt was made to identify the composition and structure of nonadherent immersion deposits of noble metals on Zn. For this purpose Cu, Au, Ni, and Ag deposits, obtained by electrochemical displacement from their salt solutions in H_2SO_4, were examined by X-rays. All of them contained redeposited Zn. 25 ref.
(L17, M26, Cu, Au, Ni, Ag, Zn)

48-L. The Formation of Molybdenum Disilicide Coatings on Molybdenum. E. A. Beidler, C. F. Powell, I. E. Campbell, and L. F. Yntema. *Journal of the Electrochemical Society,* v. 98, Jan. 1951, p. 21-25.

Mo can be rendered highly resistent to oxidation by treatment with an H_2-$SiCl_4$ atmosphere at 1000-1800° C. which produces a molybdenum disilicide coating. Coatings thus produced have completely protected the base metal for over 4000 hr. in air at 1000° C. and for over 30 hr. at 1700° C. Thicker coatings, within limits, give proportionately longer lives. (L15, Mo)

49-L. Plating and Metal Spraying: Complementary Processes. W. E. Ballard. *Electroplating and Metal Finishing,* v. 3, Dec. 1950, p. 600-604.

Similarities and differences between the two processes and suggestions which may be of service to both industries. Applications of each. (L17, L23)

50-L. Developments in Internal Pipe-Coating. J. K. Alfred. *World Oil,* v. 132, Jan. 1951, p. 181-184, 186, 190.

Internal coatings now being used to protect pipe lines against internal corrosion by West Texas, Permian Basin sour crudes. Plastic linings, applied in place; cement lining applied in the mill or plant; and cement lining applied in place. Relative costs and other economic data concerning these preventive measures. (L26, CN)

51-L. New Vacuum-Blasting Tools Aid Welding, Drum Cleaning. D. H. Stormont. *Oil and Gas Journal,* v. 49, Jan. 11, 1951, p. 78, 80.

Vacuum equipment is combined with an abrasive blast machine in improved metal-cleaning tool. (L10)

52-L. Metallic and Nonmetallic Coatings for Gray Iron. Charles O. Burgess. *Foundry,* v. 79, Jan. 1951, p. 96-99, 225-236.

Second of 3 articles. Application of hard facings, diffusion coatings, and electrodeposition of various metals to gray-iron castings. 35 ref. (To be concluded.)
(L15, L17, L24, CI)

53-L. Cadmium-Tin Alloy Plating Stops Corrosion. B. E. Scott. *Iron Age,* v. 167, Jan. 18, 1951, p. 59-62.

Extensive tests which led to development of a successful Cd-Sn alloy plating solution. The deposit is obtained from a fluoborate solution and contains approx 75% Cd and 25% Sn. Far greater corrosion resistance in low-alloy steel is achieved than with Cd or Sn of comparable thicknesses.
(L17, R general, Cn, Cd, Sn)

54-L. Clean Surfaces Important in Finishing Die Cast Parts. *Die Castings,* v. 9, Jan. 1951, p. 39-40, 42-43, 61-63.

Cleaning methods for various nonferrous metals which are die cast. (L12, L13, EG-a)

55-L. Critical Review of the Literature. (Continued.) Henry B. Linford and Edward B. Saubestre. *Plating,* v. 38, Jan. 1951, p. 60-65.

Continues review of various chemical solutions used for plating. Covers solvent cleaners, solvent-emulsion cleaners, and descalers. (To be continued.) (L12)

56-L. Liquid Blasting Trims Die Polishing Time 10%. *Steel,* v. 128, Jan. 22, 1951, p. 77.

Use to remove heat treating scale and discoloration from forging dies at Rockford Drop Forge Co., Rockford, Ill. (L10, ST)

57-L. A Practical Method for Plating on Magnesium. Allen G. Gray. *Products Finishing,* v. 15, Jan. 1951, p. 36, 38, 42, 46, 48, 50, 52, 54, 58, 60, 62, 64.

Reviews work of Dow Chemical Co. on above method, first described by H. K. DeLong, in *Proceedings of the American Electroplaters' Society,* v. 36, 1946, p. 217-226. (L17, Mg)

58-L. Protective Films for Pilot-Plant Deodorizers. R. E. Beal and E. B. Lancaster. *Journal of the American Oil Chemists' Society,* v. 28, Jan. 1951, p. 12-16.

An oxidized oil film is an effective coating for metals used in the construction of pilot-plant deodorizers. The oil film is easily formed on a metallic surface, and can be readily removed when the metal is cleaned with caustic. A silicone varnish film baked on the metal surface is somewhat less effective than an oil film. Other methods of treating steel or stainless steel, which include coating the metal with a polymeric ether-linked wax, grit-polishing, and electropolishing, are fairly effective in reducing corrosion of the metal during deodorization. (L26, SS, ST)

59-L. Internal Pipe Coating Techniques. J. K. Alfred. *Petroleum Engineer,* v. 23, Jan. 1951, p. D26, D28-D34.

Use of plastic and cement-lined coatings in the Permian Basin area for protection against corrosion by sour crude oils. (L26, CN)

60-L. Problems of the Metal Decorator. Charles R. Bragdon. *Interchemical Review,* v. 9, Autumn 1950, p. 43-53.

An illustrated survey. (L26)

61-L. Method for Removing Weld Discoloration. Ira S. Roberts. *Modern Machine Shop,* v. 23, Jan. 1951, p. 256, 258, 260.

Method developed by Armco Steel Corp. is especially useful in removing discoloration from hard-to-get-at interior corners of stainless-steel weldments. The discoloration is removed by passage of direct current through an acid solution, using copper rod as negative and stainless part as positive electrode. (L13, SS)

62-L. Compact Fabricating and Finishing Setup for Refrigerator Evaporators. Ezra A. Blount. *Products Finishing,* v. 15, Jan. 1951, p. 10-16.

Steel refrigerator evaporators are hot-dip galvanized, phosphatized, and sprayed with an Al baking lacquer in the Evaporator Division of Heintz Mfg. Co., Philadelphia. (L16, L14, L26, CN, Zn, Al)

63-L. Some Practical Notes on Tin/Zinc Alloy Plating for Ferrous Components. *Products Finishing,* v. 15, Jan. 1951, p. 22-24, 26, 28, 30, 32. (L17, Fe, ST, Sn, Zn)

64-L. Grinding and Polishing Goes Modern. H. N. Acker. *Canadian Metals,* v. 13, Dec. 1950, p. 32-33, 35, 50.

Procedures, equipment, and applications of abrasive-belt grinding. (L10)

65-L. Polish Up Your Buffing Data. H. J. McAleer. *Canadian Metals,* v. 13, Dec. 1950, p. 36-38, 51.

A 4-in-1 process involving stock removal, burnishing, coloring, and chemical action. Surveys the wide range of buffing compounds and buffing methods used. (L10)

66-L. Improved Finish Through Better Surface Cleaning. J. C. Harris. *Canadian Metals,* v. 13, Dec. 1950, p. 41-42, 44-45.

Various methods (mainly chemical) for removal of submicroscopic surface films from metals. Methods for evaluation of quality of the cleaning job. 13 ref. (L12)

67-L. Metal Colouring and Bronzing; Review of Methods of Surface Preparation. C. Harris. *Metal Industry,* v. 77, Dec. 22, 1950, p. 295-298. (L14)

68-L. Plating Aluminum; Commercial Methods of Depositing Nickel and Chromium. R. Fyfe. *Metal Industry,* v. 77, Dec. 22, 1950, p. 300-302.

Two commercial methods and a new process, including surface pretreatment and analytical procedures for the plating bath, which has produced successful deposits with less than 2% rejects. (L17, Al, Ni, Cr)

69-L. Electrochemical Potential in a Hydrofluoric Acid Solution and Electropolishing of Columbium. (In French.) M. Cottin and M. Haissinsky. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 47, Sept.-Oct. 1950, p. 731-732.

Electrochemical potential and optimum conditions for electropolishing a 5-mm. Cb rod were determined. (L13, Cb)

70-L. Production and Use of "Double". (In German.) W. Radecker. *Metall,* v. 4, Dec. 1950, p. 516-517.

The distinction between the mechanical electrolytic deposition of noble metals on base metals, or rolled-on gold vs. electroplating. The term "doublé" refers to the rolled-on or clad process. (L22, L17, Au)

71-L. Cold-Rolled Strip Electrolytically Tinned. (In German.) Vincens Seul and Robert Mintrop. *Stahl und Eisen,* v. 70, Dec. 7, 1950, p. 1154-1164; disc., p. 1165-1166.

Comparative data on properties and microstructure of hot dipped

and electrolytic tin plate. Relative merits of various plating baths. (L17, CN, Sn)

72-L. Non-Electrolytic Nickel Plating as a Protective Coating During Nitriding. (In Czech.) Jan Korecky. *Hutnické Listy,* v. 5, Oct. 1950, p. 414-416.

Process developed by A. Brenner of the National Bureau of Standards (U. S.) was found to be suitable for local protection during nitriding. A layer 0.002-0.003 mm. thick, grown in 10-15 min., is said to be adequate for protection during the usual nitriding process (500° C. for 48-96 hr.). (L17, J28, Ni, ST)

73-L. Advances in Production Methods in Metal Finishing. Adolph Bregman. *Metal Progress,* v. 59, Jan. 1951, p. 76-81.

Reviews developments of past five years. (L general)

74-L. Wear Resistant Electroplate. *Metal Progress,* v. 59, Jan. 1951, p. 114, 116. (Condensed from "Electrodeposition of Alloys of Phosphorus and Cobalt or Nickel", Abner Brenner, Dwight E. Couch, and Eugenia Kellogg Williams.

Previously abstracted from *Journal of Research of the National Bureau of Standards* and from *Plating.* See items 98-L and 188-L, 1950. (L17, Co, Ni)

75-L. Automatic Plating Meets Stiff Defense Production Standards. John V. Davis. *Steel,* v. 128, Jan. 29, 1951, p. 63-66.

Equipment and procedures applicable to a wide variety of jobs. (L17)

76-L. Tapered Step-Down Shafts Brushed 20% Faster. *Steel,* v. 128, Jan. 29, 1951, p. 72.

Improved brushing equipment removes heat treat discoloration and surface imperfections from tapered alloy steel golf club shafts. (L10, AY)

77-L. Report on the Cleaning of Sheet Metal Prior to Vitreous Enameling. *Sheet Metal Industries,* v. 28, Jan. 1951, p. 89-94.

Experimental work on electrolytic cleaning; emulsion spray cleaning; effect of additions of surface-active agents to the ground-coat slip; phosphate coating; relation between chemical constitution and aging; and grease burning for cleaning. Appendixes cover alkaline cleaning and degreasing before vitreous enameling; trichlorethylene degreasing; high-temperature grease burning and acid scaling of sheet iron; experiments with phosphate coating; and degreasing and enameling tests on standard cups. (L12, L13, L27, CN)

78-L. Lacquering Metals: Brushing; Spraying; Dipping; Barrelling. E. S. Tonks. *Metal Industry,* v. 77, Dec. 29, 1950, p. 319-321.

Pros and cons of these processes; also their respective applications. (L26)

79-L. "Bonderizing"; Equipment and Processes for Paint Adhesion. M. Reeves. *Metal Industry,* v. 78, Jan. 5, 1951, p. 7-8.

A method of pretreatment that provides a corrosion-inhibiting base for a subsequent high-class paint finish: It can be easily and quickly applied to iron, steel, galvanized iron or "galvanneal," cast iron, Zn-base die castings, Cd and Al. (L14)

80-L. From A Metallurgist's Notebook: Porous Die-Castings. *Metal Industry,* v. 78, Jan. 5, 1951, v. 78, Jan. 5, 1951, p. 9-10.

Conclusions drawn from an investigation of difficulties encountered in polishing Zn-base die castings. (L12, E13, Zn)

81-L. Plant Control to Reduce Enamelling Rejects. J. H. Gray. *Foundry Trade Journal,* v. 90, Jan. 4, 1951, p. 19-23. (L27, CN)

82-L. The Effect of Ultrasonics on Electrolytic Processes. I. Electrodeposition of Nickel in an Ultrasonic Field. (In German.) Albert Roll. *Zeitschrift für Metallkunde,* v. 41, Oct. 1950, p. 339-343.

An experimental arrangement for the generation and application of ultrasonic frequencies to electroplating. Qualitative experimental results and data in the form of graphs. (L17, Ni)

83-L. Chemical and Electrochemical Sharpening of Worn Files. (In German.) *Metalloberfläche,* sec. B, v. 2, Dec. 1950, p. 179-180.

Experimental evaluation of proposed methods shows that they can prolong the life of files from 20 to 50%, mostly because of the cleaning and roughening action of the acids or electrolytes, rather than because of their sharpening effect. (L12, L13, ST)

84-L. Polarographic Method for Determination of the Rate Constant of Electrolysis and Thickness of the Diffusion Layer During Electrodeposition of Metals. (In Russian.) P. N. Kovalenko. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Oct. 1950, p. 1067-1079.

Experimental investigation confirms the applicability of Fick's formula for calculation of the rate constant. Study of the influence of pH of the buffer solution on rate

of electrodeposition of Cu shows that a high hydrogen index strongly inhibits electrolysis of Cu. Graphical method of determining rate of electrolysis. Applicability of the equations of Ilkovich, Nernst, and Bruner for determination of diffusion-layer thickness is proven. 11 ref. (L17)

85-L. Metallic and Nonmetallic Coatings for Gray Iron. (Concluded.) Charles O. Burgess. *Foundry,* v. 79, Feb. 1951, p. 108-111, 226-234.

Organic finishes, chemical conversion coatings, coloring, and cement lining and armor. 20 ref. (L general, CI)

86-L Finishing Military Aircraft. Part I. Metal Cleaning. Gilbert Close. *Industrial Finishing,* v. 27, Jan. 1951, p. 26-28, 31-32, 34, 36, 38, 40, 42.

Descriptive review of procedures. Covers steel, brass, bronze, Zn, Al, Mg, etc. (L12)

87-L. Whirling Flowcoater Used in Cleaning and Prime Coating Setup. Charles B. Levinson. *Industrial Finishing,* v. 27, Jan. 1951, p. 46-48, 50, 52.

Equipment used to finish various steel items for the building trades. (L12, CN)

88-L. New Blackening Bath for Ferrous Metals. A. F. Holden. *Materials & Methods,* v. 33, Jan. 1951, p. 128, 130.

New bath for use with stainless steels, cast iron, or most steels. Offered under the trade name Perma-Black, it is finding use in blackening of ferrous metals for either increased corrosion resistance or nonreflectivity. (L14, ST, SS, CI)

89-L. Abrasive Tumbling—A Precision Finishing Method. *Steel,* v. 128, Feb. 5, 1951, p. 81-84, 86, 89.

An illustrated review of recent developments in equipment, procedures, and applications. (L10)

90-L. Pot Life in Gas-Fired Galvanizing Settings. A. Higgs. *Industrial Gas,* v. 29, Jan. 1951, p. 10-11, 24-25. (Reprinted from *Institution of Gas Engineers,* Copyright Publication 370, "A Symposium of Short Papers", 1950, p. 25-29.)

Some British galvanizing practice together with tabulated performance data for several installations. (L16, Zn, ST)

91-L. Rails are Flame Cleaned and Sprayed With Rust Preventive to Thwart Salt-Air Corrosion on the Great Northern. *Railway Engineering and Maintenance,* v. 47, Feb. 1951, p. 127-129.

Equipment and procedures. (L14, R3, CN)

92-L. Plating Improved With Reverse Current Techniques. G. W. Slomin. *Iron Age,* v. 167, Feb. 8, 1951, p. 94-96.

Process which combines plating and electrolytic polishing in one operation. Current reversal reduces surface imperfections and holds edge build-up to a minimum. Brightness is also improved. Present and potential applications to a wide variety of metals. (L17, L13)

93-L. The Strength and Ductility of Electrodeposited Metals. III. Some Problems Relating to Specimen Preparation. Harold J. Read and Thomas A. Prater. *Plating,* v. 38, Feb. 1951, p. 142-144.

Variables encountered in specimen preparation are divided into two major classifications; those associated with the bath and directly related to it; and those which depend on other factors involved in plating and testing. Stresses variables of the second group. (L17, Q23)

94-L. Review of the Month: Plating From Copper Cyanide Baths. *Plating,* v. 38, Feb. 1951, p. 145-146.

Recommended bath compositions and procedures. (L17, Cu)

95-L. Cleaning and Preparation of Metals for Electroplating. I. Critical Review of the Literature. (Concluded). Henry B. Linford and Edward B. Saubestre. *Plating,* v. 38, Feb. 1951, p. 158-166.

Standards of cleanliness and methods of evaluating cleanliness. Final installment of Part I. Includes all references for Part I. 192 ref. (L17)

96-L. Electroforming—a Mass-Production Tool. *Steel,* v. 128, Feb. 12, 1951, p. 77-80.

The process and its varied applications. $100 million worth of products ranging from fountain pen caps to jet-engine motor mounts are produced annually. Plating solutions and properties for Ni, Cu, Fe, Co, and Ag. (L18, Ni, Cu, Fe, Co, Ag)

97-L. Western Spring Manufacturer Develops New Coating and Novel Dipping Process. Louis A. Berard. *Western Metals,* v. 9, Jan. 1951, p. 31-32.

New process for latex dip coating of bed and cushion springs. (L26. CN)

98-L. Electrodeposition of Germanium. Gustav Szekely. *Sylvania Technologist,* v. 4, Jan. 1951, p. 20.

Two plating baths and results obtained. (L17, Ge)

99-L. Glass as a Coating for Steel; Some Examples of the Functional Use of Glass-Coating Process. W. G. Martin. *Mechanical Engineering,* v. 73, Feb. 1951, p. 109-113.

(L27, ST)

100-L. Ductility in Organic Bright Nickels; Effects of Contamination, Plating Conditions, & Cleaning Procedure. H. G. Patching. *Electroplating and Metal Finishing,* v. 4, Jan. 1951, p. 4-5, 12.
(L17, Ni)

101-L. Coated Abrasives—Their History, Manufacture, and Application in Metal Finishing. A. E. Brown. *Electroplating and Metal Finishing,* v. 3, Dec. 1950, p. 606-608; v. 4, Jan. 1951, p. 6-8.
The various types of abrasives available and the methods of grading them, types of backing material in use, together with relative advantages and disadvantages, and influence of methods of coating on properties and utility. Second part covers the backing material, the adhesives, coating methods, and applications. (L10)

102-L. The Properties of Thick Sprayed Metal Coatings. J. Grilliat. *Electroplating and Metal Finishing,* v. 4, Jan. 1951, p. 13-15, 23. (Translated and condensed.
Previously abstracted from *Métaux et Industries.* See item 802-L, 1950. (L23, Q general, P general, M27)

103-L. Electroplating on Aluminum. *Electroplating and Metal Finishing,* v. 4, Jan. 1951, p. 16-18.
Notes on the nature of the problem and on a modified acid pickle for the anodizing pretreatment method. (L17, L19, Al)

104-L. Electrodeposition of Tin and Tin Alloys. J. W. Cuthbertson. *Electroplating and Metal Finishing,* v. 4, Jan. 1951, p. 26-27.
Summarizes two lectures.
(L17, Sn, ST)

105-L. Plastics for Protective Coatings and Linings of Chemical Plant. E. E. Halls. *Metallurgia,* v. 42, Dec. 1950, p. 376-381.
The various types of plastics used; methods of application; and suitability for specific needs. (L26)

106-L. From a Metallurgist's Notebook: Enamelled Name Plates. H. H. Symonds. *Metal Industry,* v. 78, Jan. 19, 1951, p. 49-50.
Longitudinal lines which, at first glance, appeared to be score marks across the enameled surface of brass nameplates formed the subject of investigation. It was shown that the marks were not grooves but ridges produced as a result of a difference in the rate of attack on the base metal during the photo-etching process. (L26, Cu)

107-L. Colouring Copper and Copper Alloys. I. Chemical Methods—Sulphide Finishes. II. Chemical Methods—Oxide Finishes. C. Harris. *Metal Industry,* v. 78, Jan. 12, 1951, p. 23-25; Jan. 19, 1951, p. 43-44, 48.
Some of the many thousands of formulas available for coloring Cu and Cu alloys that give a consistent character. (L14, Cu)

108-L. Highly Unorthodox Innovations in the Enamel-Industry. (In German.) Hans. J. Karmaus. *Sprechsaal für Keramik; Glas; Email,* v. 83, Nov. 20, 1950, p. 453-456; Dec. 5, 1950, p. 473-476; Dec. 20, 1950, p. 493-497.
German patented innovations that cover the entire enameling process, including production, treatment, and pickling of the metal to be enameled; preparation and application of the enamels; enamel-melting furnaces, methods of preventing enameling defects; inspection methods; and enamel drying and milling equipment. (L27)

109-L. Concerning Structure of the Oxide Formed on an Aluminum Surface. (In Russian.) M. S. Beletskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Dec. 1, 1950, p. 551-553.
Assumption of Trillat, Brandenburger, and others, that the oxide surface layer of Al consists of γ-Al_2O_3 and bemite, is challenged. Results of investigation showed that bemite ($Al_2O_3 \cdot H_2O$) does not form during the oxidation of Al, but is the product of a secondary reaction taking place between water and dispersed Al_2O_3 present on the surface. Method of investigation.
(L19, R2, Al)

110-L. Electrolytes for Electropolishing and Etching. (In Swedish.) E. Knuth-Winterfeldt. *Jernkontorets Annaler,* v. 134, No. 10, 1950, p. 538-539.
Electrolytes proposed by various authors were comparatively investigated. Results and applicability to various metals. (L13)

111-L. On the Electrolytic Polishing of Copper Alloys. (In English.) Tosihiko Okamura and Takasi Kimura. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Dec. 1949, p. 467-472.
Conditions and mechanisms of electropolishing of various alloys of the Cu-Zn, Cu-Al and Cu-Al-Zn system were investigated by obtaining Jacquet's characteristic curves. These were also measured for effects of additional elements on the alloys. (L13, Cu)

112-L. Protective Coating by Means of Chromium Diffusion. (In Spanish.) Walter Tofaute and W. Kock. *Instituto del Hierro y del Acero,* v. 3, July-Sept. 1950, p. 187-194.

Method as applied to steel, and its mechanism. The process of diffusion of Cr into the steel and structure of the intermediate layer are emphasized. (L15, ST, Cr)

113-L. Scale Removal Technique With the Stainless Steels. *Steel Processing*, v. 36, Dec. 1950, p. 623-628; v. 37, Jan. 1951, p. 28-30.

Mechanical and chemical methods and equipment. Eleven pickling-solution recipes and their applicabilities. Part II: details of experimental work on a $Fe_2(SO_4)_3$-HF bath, and method for its control analysis. (L10, L12, SS)

114-L. Aluminum Cylinders Without Cast Iron Liners. P. M. Heldt. *Automotive Industries*, v. 104, Feb. 15, 1951, p. 32-33, 98, 100, 104. (Condensed from article by Ernst Mahle in a recent issue of *Motortechnische Zeitschrift*.)

Recent developments in Germany which demonstrate feasibility of Cr plating Al cylinder bores. (L17, Cr, Al)

115-L. Continuous Electroplating Effects Operational Economy. Dan Reebel. *Steel*, v. 128, Feb. 19, 1951, p. 64-66.

Millions of small stamped fastening devices, pre-assembled screws and nuts, and twisted-tooth lockwashers are Zn and Cd plated annually at Shakeproof's new Elgin, Ill., plant. (L17, T7, Zn, Cd)

116-L. Surface Active Agents and Pickling Brittleness. Carl A. Zapffe and M. Eleanor Haslem. *Wire and Wire Products*, v. 26, Feb. 1951, p. 127-133.

Continues a series of researches on embrittlement of steel caused by absorption of hydrogen during acid pickling. Effects of bath additions other than pickling inhibitors—specifically the so-called surface active agents—also a foaming compound. Measurements of bendability using a specially designed wire bend test were used to follow quantitatively the changes produced by each reagent, alone and in combination with inhibitors in a standard 10% H_2SO_4 bath. (L12, Q23, ST)

117-L. Improve Product Appearance With Electrolytic and Chemical Finishes. *Product Engineering*, v. 22, Feb. 1951, p. 141-148.

Special section covers classes and types; how base metal affects selection; appearance and protective finishes; new developments and industry trends. Colored photographs of products. Folded chart shows properties, limitations, specifications, surface preparation, and uses of all types of organic, inorganic, and specialty finishes for metals. (L general)

118-L. Some Characteristics of Composite Tungsten Carbide Weld Deposits. Howard S. Avery. *Welding Journal*, v. 30, Feb. 1951, p. 144-161; disc., p. 161-162.

The characteristics of weld deposits from rods made by enclosing tungsten carbide granules in a mild-steel tube are shown to provide high abrasion resistance for hard facing use. The matrix has characteristics that range from those of tungsten steel to those of cast iron containing a considerable amount of secondary W-Fe carbides. Abrasion resistance depends largely on volume of undissolved carbides, and is generally better for gas welds. Vickers microhardness and microstructures. (L24, Q9, C-n, W, SG-j)

119-L. Self-Regulating High Speed Chromium Plating. J. E. Stareck, F. Passal, and H. Mahlstedt. *Proceedings, American Electroplaters' Society*, v. 37, 1950, p. 31-47; disc., p. 48-49.

A new process which includes the following characteristics: self-regulation, high current efficiency, high plating speed, wide plating range, activating effect, smooth deposits, and leveling action. (L17, Cr)

120-L. The Nodule Method of Measuring the Adhesion of Electrodeposited Coatings. Abner Brenner and Virginia Dare Morgan. *Proceedings, American Electroplaters' Society*, v. 37, 1950, p. 51-65; disc., p. 66-67.

Nodule method requires a skilled technician and is time consuming (10 specimens per day), but requires no specially shaped test pieces and no machining operations or expensive physical testing machines. Results are expressible in terms of ordinary mechanical units. (L17)

121-L. Advances in Electrodeposition in the Graphic Arts. Edward I. Peters. *Proceedings, American Electroplaters' Society*, v. 37, 1950, p. 69-84, disc. p. 84.

Rotogravure plate making, bimetallic hthographic plates, electrotyping, and miscellaneous applications of electrodeposition. Includes flow charts. 33 ref. (L17, T9)

122-L. High-Speed Nickel Plating of Curved Stereotypes. Kenneth L. Koessler and Robert R. Sloan. *Proceedings, American Electroplaters' Society*, v. 37, 1950, p. 85-89; disc., p. 89-90.

A nickel fluoborate solution produces the desired structure of the deposit with ease of solution control, extremely high deposition rates, stability toward pH changes, and economy of operation. Test procedure and results. (L17, Ni)

123-L. Electroplating and Metal Finishing Developments in Germany:

1940-1950. Richard Springer. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 91-102; disc., p. 103.

Previously abstracted from *Metalloberfläche.* See item 612-L, 1950. (L17, L general)

124-L. Smoothing by Electropolishing and Chemical Polishing. Charles L. Faust. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 137-150; disc., p. 150.

Reduction of friction, and structure and adhesion of electrodeposits. (L12, L13)

125-L. Leveling With PR Current Plating. George W. Jernstedt. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 151-167; disc., p. 167-170.

Mechanical, chemical, and electrochemical methods of obtaining leveling. Factors affecting leveling with periodic-reverse current plating which include PR cycle, current density, thickness of deposit, agitation, solution composition, addition agent, and contamination. Applications of leveling. (L17)

126-L. Some Observations of the Microthrowing Power of Plating Solutions. C. E. Reinhard. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 171-183; disc., p. 183.

An investigation of the controlling factors. An understanding of the mechanism by which microthrowing power functions was not obtained. It is believed that reactions taking place in a cathode film and the electrical characteristics of a porous cathode surface need to be more clearly understood. (L17)

127-L. Leveling in Cobalt-Nickel Plating Solutions. Louis Weisberg. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 185-191, disc., p. 191.

Leveling in a particular type of Ni-plating solution which is distinguished by the presence of some added Co. Purification and operating conditions and physical characteristics and corrosion resistance of deposits. (L17, Ni)

128-L. Surface Contour and Leveling. A. H. DuRose, W. P. Karash, and K. S. Willson. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 193-212; disc., p. 212-213.

Reviews the literature on leveling by plating, polishing, and buffing. Need for information on deposit distribution in and adjacent to small scratches. Suggests several methods of approach to the problem. Need for a more fundamental understanding of reactions at the cathode under various conditions 24 ref. (L17, L10)

129-L. General Discussion of Leveling. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 215-222.

Refers to surface finishing by various methods for the specific purpose of making the surfaces as level as possible. (L general)

130-L. Metal Finishing by Abrasive Tumbling. Hubert M. Goldman. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 223-242; disc., p. 242-243.

A general discussion of the phases and factors involved. (L10)

131-L. Abrasive Belt Polishing. E. E. Oathout. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 245-249; disc., p. 249-250.

New mechanical equipment and improvements developed since the war. (L10)

132-L. Reduction in Plating Cost by Use of Flat-Polished and Phosphate-Coated Steel. H. J. McVey and V. M. Darsey. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 251-254; disc., p. 254-255.

Automatic polishing of steel in the flat followed by phosphate coating and lubrication to protect the polished surface during the forming operation. (L10, L14, ST)

133-L. Water Base Buffing Liquid. Ellsworth T. Candee and S. Lewis Doughty. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 257-266; disc., p. 266.

Aqueous emulsions with a solid internal phase which retain advantages of standard buffing-bar compounds and eliminate restrictions due to mechanical considerations. They also eliminate fire hazard and tendency of the abrasive to settle. Applications. (L10)

134-L. Why Pay for Porosity Research? *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 277-278.

Discussion of article by W. A. Wesley previously abstracted from *Plating.* See item 598-L, 1950. (L17)

135-L. The Use of Radioactive Isotopes for the Determination of Current and Metal Distribution in Electrodeposition. John Kronsbein. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 279-285; disc., p. 286-288.

A new method for determining current and metal distribution in the electrodeposition of Cu from an acid-sulfate solution. Also indicates a new method for accurate measurement of extremely thin electrodeposits. Includes plots of radiation distribution for different shapes. (L17, S19, Cu)

136-L. Selection and Application of Cleaning Room Equipment. Stanley Krzeszewski. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 450-455.

Previously abstracted from *American Foundryman.* See item 296-L, 1950. (L10, L12, E general)

137-L. Surface Treatment and Finishing of Light Metals. Part 5. (Series continued.) S. Wernick and R. Pinner. *Sheet Metal Industries,* v. 28, Jan. 1951, p. 79-87.

The anodizing process for Al: theory; types of anodizing processes; application of anodizing; protective applications; decorative applications; adhesion of organic finishes; composition of the coating; dielectric or barrier layer; porosity; mechanism of film growth; and secondary reactions. 33 ref. (To be continued.) (L19, Al)

138-L. Etch Pre-Treatment Primers. E. E. Halls. *Machinery* (London), v. 78, Jan. 18, 1951, p. 114-116.

Various types for use on a variety of metal surfaces prior to painting, which, in addition to providing protection against corrosion, also have the effect of etching the metal surface so that adhesion of both primer and paint is considerably improved. Qualitative performance of various metals and alloys, pretreated in different ways before application of enamel-type paints. (L26)

139-L. Colouring Miscellaneous Metals: Silver—Tin—Gold—Zinc—Cadmium—Nickel. C. Harris. *Metal Industry,* v. 78, Jan. 26, 1951, p. 71-73.

The more important commercial methods.
(L14, Ag, Sn, Au, Zn, Cd, Ni)

140-L. Some Preliminary Treatments for Tungsten Wires Used in Electron Tubes. (In French.) Mesnard and Uzan. *Vide,* v. 5, Nov. 1950, p. 896-904.

Methods for cleaning tungsten wires, an important factor in the quality of electron tubes. Removal is of graphite by mechanical and chemical methods. Several anomalies observed during measurement of temperature of a tungsten wire in a vacuum. Photomicrographs show wire structures under various conditions. (L10, L12, T1, W)

141-L. Procedure for Cathodic Atomization of Metal. (In French.) M. E. H. Bacquet. *Vide,* v. 5, Nov. 1950, p. 916-917.

Apparatus and procedure. Qualitative results obtainable with different metals. A table gives rates of atomization for series of pure metals in dry air, nitrogen, hydrogen, or oxygen. Atomized metal is removed from the vicinity by vacuum and deposited where desired. (L25)

142-L. Role of Ion Hydration in Electropolishing Baths. (In French.) Eugene Darmois, Israel Epelboin, and Djafar Amine. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Nov. 27, 1950, p. 1222-1223.

The role of water supplied by solutions containing anhydride ions was studied. Results show that the effect is proportional to the quantity of free H_2O, which depends directly on the degree of cation hydration. This property may be used in determination of the degree of hydration of ions. (L13)

143-L. (Book) **Modern Development in Metal Finishing.** Arrow Press, Ltd., 29 Grove Rd., Leighton Buzzard, Beds., England. 5s.

Edited version of eight lectures (several previously abstracted). The contents include: "Developments in Electrodeposition Processes and in Plant for Electrodeposition," E. A. Ollard; "Phosphate Treatments for Iron and Steel," H. A. Holden; "The Protection and Decoration of Aluminium," V. F. Henley; and "Methods for the Protection of Magnesium Alloys," W. F. Higgin. Three lectures dealing with history and general principles, composition and application methods, and industrial applications of vitreous enamel are included by W. E. Benton, S. Hallsworth, and H. Laithwaite, respectively. (L general)

144-L. (Book) **Galvanizing (Hot-Dip).** Ed. 3. Heinz Bablik. (Clive A. Bentley, translator). 502 pages. 1950. E. & F. Spon, Ltd., 15 Bedford St., Strand, London W.C.2, England. 70s.

The sections on electrogalvanizing, sherardizing and spraying, included in the 1936 edition, have been omitted but the book has nevertheless been increased slightly in size. The treatment follows, in general, that of the earlier editions. Theoretical and experimental aspects receive far more attention than the practical side of the subject.
(L16, CN, Zn)

145-L. (Book) **Chromium Plating.** E. S. Richards. Ed. 3. 154 pages. 1950. Charles Griffin & Co., Ltd., 42 Drury Lane, London W.C.2, England. 17s.

Deals not only with the actual operation of chromium plating but also with auxiliary processes, pretreatments and related topics such as the plating shop and its equipment; stripping; polishing; cleaning; Cu and Ni plating; finishing Cr plate; and protection of workers.
(L17, Cr)

146-L. Flame Sprayed Plastic Coatings. Bernard Goldberg. *Corrosion* (Technical Section), v. 7, Feb. 1951, p. 47-50.

The history of flame spraying. Guns and containers used for applying plastic powders. Problems involved in producing suitable powders of tough non-friable resins. Properties of flame sprayed Thiokol. Improvements in flame-spraying technique. Effect of after-treatments. Experimental work on producing flame-sprayed fluorinated-hydrocarbon coatings. Production of smooth non-porous coatings of hot-melt compositions. (L26)

147-L. Some Factors Affecting Paint Performance on Cathodically Protected Steel. Arnold J. Eickhoff and David L. Hawke. *Corrosion* (Technical Section), v. 7, Feb. 1951, p. 70-74.

Some fundamental considerations and results of laboratory work using five types of pigmented vehicles having greatly differing alkali resistance. Solvent-cleaned cold rolled steel panels were coated and tested in 3% NaCl and 5% NaOH solutions while coupled to Mg panels or to carbon rods with an imposed external emf. (L26, R11, ST)

148-L. Chemical Removal of Copper From Boilers. R. G. Call and W. L. Webb. *Transactions of the American Society of Mechanical Engineers,* v. 73, Feb. 1951, p. 125-129; disc., p. 129-133.

When acid-cleaning a 1,000,000-lb. per hr. boiler for removal of deposits which were predominantly iron oxide, the boiler metal was heavily plated with Cu. During subsequent operation this Cu became detached in large sheets which affected circulation adversely, making Cu removal mandatory. A solvent was developed containing $(NH_4)_2S_2O_8$, NH_4OH, and NaOH which removed about 300 lb. of Cu. Procedures, results, and costs. (L12, ST, Cu)

149-L. Phosphoric-Acid Cleaning of Boilers. T. E. Purcell and S. F. Whirl. *Transactions of the American Society of Mechanical Engineers,* v. 73, Feb. 1951, p. 135-139.

Because of the limitations and adverse effects of HCl, the possibility of using phosphoric acid for boiler cleaning was investigated. Inhibited phosphoric acid is a good solvent without the unfavorable properties and characteristics of inhibited HCl acid. This material has been used successfully for removing rust and mill scale from a new boiler. (L12, ST)

150-L. Chrome Plating Electrotype and Stereotype Printing Plates. Axel Lundbye. *Printing Equipment Engineer,* v. 81, Jan. 1951, p. 26-27; Feb. 1951, p. 44-46.

The process and its applications, not only to printing plates, but to a variety of printing-equipment parts to increase their wear resistance. (L17, T9)

151-L. High-Speed Paint Spray Line Uses Electrostatic Method. *Die Castings,* v. 9, Feb. 1951, p. 42, 44, 52.

Method applied to large die-cast Zn Alloy record-changer bases made. (L26, Zn)

152-L. Some Results of Experimental Work on the Suspension and Biscuit Strength of Vitreous Enamels. H. Laithwaite. *Sheet Metal Industries,* v. 28, Feb. 1951, p. 185-188; *Foundry Trade Journal,* v. 90, Feb. 1, 1951, p. 123-126. (L27, ST)

153-L. A Study of the Use of Lithium in Vitreous Enamels. S. Hallsworth. *Sheet Metal Industries,* v. 28, Feb. 1951, p. 189-192.

Effects of Li additions to various types of vitreous enamels were studied. (L27, ST)

154-L. Electrodeposition of Thallium; Improved Method Claimed by Italian Research. *Chemical Age,* v. 64, Feb. 3, 1951, p. 211-212.

Reviews work of E. Bertorelle and co-workers, *La Chimica et l'Industria,* v. 32, 1950, p. 517-522. (L17, T1)

155-L. Small Parts Coated in Automatic Machine. *Iron Age,* v. 167, Feb. 22, 1951, p. 70.

Efficiency in painting or waxing of small steel parts is increased 200-300% in an automatically operated spinning cabinet at Tinnerman Products, Inc., Cleveland. (L26, ST)

156-L. Metal Finishing Forges Ahead. Adolph Bregman. *Iron Age,* v. 167, Feb. 22, 1951, p. 78-82.

See abstract of "Advances in Production Methods in Metal Finishing", *Metal Progress,* item 73-L, 1951. (L general)

157-L. Antimony Plate. Adolph Bregman. *Metal Progress,* v. 59, Feb. 1951, p. 245-247.

Pure Sb resists attack by HCl and HF, is relatively tarnish resistant, and is easily buffed to a highly reflective surface. Successful plating techniques which make it a substitute for the more critical metals, Ni and Cr. (L17, Sb)

158-L. Protection of Refractory Metals. *Metal Progress,* v. 59, Feb. 1951, p. 288, 290. (Translated and condensed from "Surface Protection of High-Melting Metals to Increase Their Sealing Resistance at High Temperatures," Helmut Buckle.)

Previously abstracted from *Metallforschung.* See item 7c-42, 1948. (L general, W, Mo, Cb, Ta, EG-d, SG-h)

159-L. Finishing Military Aircraft. Part II. Chemical Surface Treatments. Gilbert Close. *Industrial Finishing,* v. 27, Feb. 1951, p. 22-24, 26, 28, 30, 32, 37. (L14, Al)

160-L. How Simplification Cuts Costs in Finishing Hot Water Heaters. Howard E. Jackson. *Industrial Finishing,* v. 27, Feb. 1951, p. 38-40, 42, 44, 46.

Procedures and equipment for degreasing, attaching trim, sanding, spray painting, and baking. (L12, L26)

161-L. Speedy Production Setup for Painting Small Parts. *Industrial Finishing,* v. 27, Feb. 1951, p. 48-49.

Automatically operated dip-whirl coating machine at Tinnerman Products, Inc., Cleveland, manufacturer of fasteners. (L26)

162-L. Methods of Evaluating Aircraft Primers. Edward T. Nelson. *Organic Finishing,* v. 12, Feb. 1951, p. 12-15; disc. p. 15-17.

Previously abstracted from *ASTM Bulletin.* See item 583-L, 1950. (L14, Al, Mg, ST)

163-L. Continuous Cascade Pickling. W. H. Stuck and J. H. Abrams. *Iron and Steel Engineer,* v. 28, Feb. 1951, p. 101-106, 108.

Equipment and procedures at Jones & Laughlin Steel Corp.'s Aliquippa works. (L12, CN)

164-L. Inspection of Pipe Coating. Marshall E. Parker. *World Oil,* v. 132, Mar. 1951, p. 178, 180, 182, 184, 186, 188.

Use of primers, enamels, felts, glass reinforcements and outer wraps. Procedural recommendations. Work of the inspector. (L26, S13, ST)

165-L. A Note on Thin Nickel Foils. Stanley Bashkin and Gerson Goldhaber. *Review of Scientific Instruments,* v. 22, Feb. 1951, p. 112-113.

Preparation by electrodeposition of Ni foils down to 250 Å thick, for experimental use. (L17, Ni)

166-L. The Deposition of Rhodium on Perspex. B. L. Ginsborg and O. S. Heavens. *Review of Scientific Instruments,* v. 22, Feb. 1951, p. 114-115.

Vacuum-evaporation technique used for experimental purposes. (L25, Rh)

167-L. Hot Applied Coal Tar Coatings. N. T. Shideler. *Petroleum Engineer,* v. 23, Feb. 1951, p. D5-D8, D10; Mar. 1951, p. D18, D20, D22, D24.

Manufacture, properties, application, and testing of coal tar coatings for steel pipelines. Second part: significance of laboratory tests and what happens in service. Recommended application procedures. (L26, CN)

168-L. Aluminum Cleaning. D. F. Seymour. *Die Castings,* v. 9, Feb. 1951, p. 37-40, 59-62; Mar. 1951, p. 41-44, 57, 67-71.

Methods and equipment, especially as applied to die-cast parts. (L12, Al)

169-L. Manufacturing Applications of Liquid Impact Blasting. B. H. Marks. *Tool Engineer,* v. 26, Mar. 1951, p. 45-47.

Various modifications of the process. Varied applications, including wet blasting the edges of Bible pages to improve the bonding of gold leaf. (L10)

170-L. Uniform High Quality Finish Obtained With Diamond Powder Abrasives. S. G. Kelley, Jr. *Materials & Methods,* v. 33, Feb. 1951, p. 65-67.

How closely graded diamond compounds can save many man-hours in the finishing and polishing of hard molds, dies, and tools. (L10)

171-L. Polishing and Plating at Repcal Brass Manufacturing Co. George H. Kent. *Products Finishing,* v. 15, Feb. 1951, p. 22-24, 26. (L10, L17, Cu)

172-L. New Finish System Promises High Erosion Resistance. Gilbert C. Close. *Products Finishing,* v. 15, Feb. 1951, p. 30-32.

Two-coat system incorporating synthetic resins and rubber developed by Minnesota Mining and Mfg. Co. for aerodynamic leading edges of high-speed military airplanes. Tests indicate this coating will serve as well for other uses where high erosion or abrasion resistance is required. (L26)

173-L. Electroforming for Plastics. *Modern Plastics,* v. 28, Mar. 1951, p. 81-84, 86-87, 90.

How spray masks and specialized molds for plastic products are accurately produced by electroplating copper shells over prepared matrices. (L18, Cu)

174-L. Electrodeposition of Rhenium-Nickel Alloys. L. E. Netherton and M. L. Holt. *Journal of the Electrochemical Society,* v. 98, Mar. 1951, p. 106-109.

Deposition from an ammoniacal citrate bath and from Ni-plating baths containing potassium perrhenate. The ammoniacal citrate bath was used to determine effects of such factors as bath composition, bath pH, bath temperature, and current density on cathode current efficiency and alloy composition. Some of the properties of electrodeposited Re-Ni alloys. (L17, Re, Ni)

175-L. The Relationship Between Orientation, Grain Size, and Brightness in Nickel Electrodeposits. G. L.

Clark and S. H. Simonsen. *Journal of the Electrochemical Society,* v. 98, Mar. 1951, p. 110-115.

A large number of electrodeposited Ni panels, deposited under varied conditions, were examined by improved X-ray diffraction techniques. Orientation and grain size were evaluated in order to determine whether or not any correlation exists between these characteristics and the fundamental optical property of brightness. X-ray grain sizes of matte, semi-bright, and bright deposits were found to be of the same order of magnitude. No correlation was found between orientation and brightness. 25 ref. (L17, M27, P17, Ni)

176-L. Attempts to Electrodeposit Zirconium. M. L. Holt. *Journal of the Electrochemical Society,* v. 98, Mar. 1951, p. 33C-35C.

Attempts were made to electrodeposit Zr and Zr alloys from numerous aqueous and nonaqueous solutions. None of the solutions used gave a weighable electrodeposit of pure Zr, but some solutions gave thin cathode deposits which contained Zr and Fe. No work with fused-salt baths for Zr is included. 14 ref. (L17, Zr)

177-L. Porcelain Enamel—Stronger Than You Think. W. A. Deringer. *Iron Age,* v. 167, Mar. 8, 1951, p. 85-87.

Contrary to popular opinion, porcelain enamel will not crack or chip from steel until the yield point of the base metal is reached or exceeded. It fails only after a certain amount of strain, which has no relation to the strength of the metal. Results of experiments at A. O. Smith Corp. 11 ref. (L27, ST)

178-L. A Highly Mechanized Plant for Sinks, Bath-tubs and Kitchen Cabinets. Warren Walker and Matt E. Heuertz. *Finish,* v. 8, Mar. 1951, p. 25-28, 58.

Facilities of Kaiser Metal Products, Inc., Bristol, Pa. Includes press operations, automatic spray pickling, and porcelain enameling. (L27, L12, G1, CN)

179-L. Three-Coat Paint System for Coastal Regions. J. G. Ford and A. J. Kuti. *Finish,* v. 8, Mar. 1951, p. 31-33, 56-57.

See abstract of "Mica-Base Paint System Doubles Transformer Tank Life," *Steel,* item 753-L, 1950. (L26, ST)

180-L. Low Pressure Spraying of Porcelain Enamel. R. S. Sheldon. *Finish,* v. 8, Mar. 1951, p. 35-37, 54-55, 80.

Advantages, material characteristics, and equipment used to secure savings in excess of $50,000 for a single year at Frigidaire Div., General Motors Corp. (L27, CN)

181-L. Preventing Corrosion With Protective Paint Coatings. George Diehlman and E. L. Beenfeldt. *Corrosion* (Technical Section), v. 7, Mar. 1951, p. 88-92.

Factors to be considered in formulation and proper use of red-lead paints. A classification of red-lead paints according to intended exposure conditions, and a reference listing of current specifications useful as a procurement basis. Factors governing performance of paint coatings: nature of metal to be coated; surface preparation, intended environmental conditions, and paints, primers, and topcoats. Results of exposure after use of various surface-preparation methods and application schedules. (L26)

182-L. Planning Keeps Roper With the Leaders. *Ceramic Industry,* v. 56, Mar. 1951, p. 60-61, 63-64, 104.

Equipment and procedures of Geo. D. Roper Corp. for production of porcelain-enameled gas ranges. Includes press operations, pickling, and finishing. (L27, G1, CN)

183-L. Unit Mechanizes Steel Lubricating. *Ceramic Industry,* v. 56, Mar. 1951, p. 66-67.

A 4-stage unit designed to take the variables out of preparing steel for deep drawing operations, which makes the operation completely automatic. The steel is cleaned, rinsed, lubricated, and dried. (L12, G21, ST)

184-L. The Electroplating Industry in Atlanta. I. Victor J. Baran. *Plating,* v. 38, Mar. 1951, p. 243-247.

Believed to be the first unbiased and detailed study of the plating industry in any city in the U. S. Tremendous growth of the plating industry, which has occurred in the South since the last war. Certain weaknesses in the organization and management of job plating shops. (L17)

185-L. Rotogravure Roll Making. *Plating,* v. 38, Mar. 1951, p. 248-252.

Procedures and equipment. Two copper layers separated by a passive nickel film are applied to a steel roll. The design is etched on the outer layer. (L18, Cu)

186-L. Cover Coat Application Directly on Steel. M. E. McHardy. *Better Enameling,* v. 22, Feb. 1951, p. 6-7, 35.

See abstract under similar title from *Refrigerating Engineering,* item 827-L, 1950. (L27, CN)

187-L. Formulation of Industrial Finishes (Metal). M. A. Glaser. *Official Digest,* June 1950, p. 418-443.

A comprehensive descriptive review. (L general)

188-L. Coastal Finish Extends Life of Distribution Transformers. J. G. Ford and A. J. Kuti. *Westinghouse Engineer,* v. 11, Mar. 1951, p. 42-45.

See abstract of "Mica-Base Paint System Doubles Transformer Tank Life," *Steel*, item 753-L, 1950. (L26, ST)

189-L. The Role of the Vehicle in Paints for Submerged Surfaces. A. C. Elm. *Paint, Oil & Chemical Review*, v. 114, Mar. 1, 1951, p. 13-14, 16, 32, 34.

Fundamental principles and their practical application to painting of underwater structures to prevent fouling and corrosion of metal surfaces. (L26)

190-L. Control of Electroplating Solutions by Analysis and Observation. XIII. The Choice and Control of Cleaning Solutions. K. E. Langford. *Electroplating and Metal Finishing*, v. 4, Feb. 1951, p. 41-44. (L17, L12)

191-L. Molybdenum in Metal Spraying by the Wire Process. R. Corbett. *Electroplating and Metal Finishing*, v. 4, Feb. 1951, p. 45-48.

Spraying and properties of Mo coatings on specially polished surfaces. Mo will adhere to brightly polished steels normally used in machine construction. Coatings have been produced to which steel and other metals will adhere, so that Mo may be used as a flash coating on polished surfaces where use of the usual shot blasting procedure is inconvenient. (To be continued.) (L23, Mo)

192-L. Electrochemical and Electrometallurgical Industries. J. O'M. Bockris. *Reports on the Progress of Applied Chemistry*, v. 34, 1949, p. 152-167.

Electrodeposition, electrorefining, and electropolishing. 101 ref. (L17, L13, C23, D8, Fe)

193-L. Multiple Finishing at Beatty Bros. H. N. Acker. *Canadian Metals*, v. 14, Feb. 1951, p. 38-40.

Wide range of finishing operation including galvanizing, electroplating, painting, and enameling. (L general)

194-L. Zinc Spraying. *Engineering & Chemical Digest*, v. 2, Dec. 1950, p. 440-446. (From ZDA Technical Memo No. 12.)

Comparatively analyzes three methods. Applications in protection of iron and steel against corrosion. (L23, Zn, ST)

195-L. Chemical Films for Metals. R. H. Warring. *Machinery Lloyd* (Overseas Edition), v. 23, Feb. 17, 1951, p. 79. (L14)

196-L. The Measurement of Throwing Power and the Prediction of Thickness Distribution. G. E. Gardam. *Journal of the Electrodepositors' Technical Society*, v. 25, 1950, p. 77-81; disc. p. 93-94.

Results of experiments and conclusions. (L17)

197-L. Throwing Power in Alloy Deposition. J. W. Cuthbertson. *Journal of the Electrodepositors' Technical Society*, v. 25, 1950, p. 81-83; disc. p. 93-94. (Preprint.)

Discusses the fact that it is possible to have a reasonable good throwing power with respect to thickness associated with a poorer throwing power with respect to composition and vice versa. Deposition of Sn-Cu alloy speculum in a bright form from a speculum electrolyte modified by certain addition agents is an example. (L17, Cu, Sn)

198-L. Practical Implications of Throwing Power. S. Wernick. *Journal of the Electrodepositors' Technical Society*, v. 25, 1950, p. 83-92; disc., p. 93-94. (Preprint.)

The determination of throwing power using cathodes of varying geometric shapes; and determining the distribution of thickness of the deposit over the surface by using the Clark jet test. Results of Ni plating. (L17, Ni)

199-L. Electrodeposits as Bases for Paints. H. Silman and Dorothy Wernick. *Journal of the Electrodepositors' Technical Society*, v. 25, 1950, p. 175-187. (Preprint.)

The value of electrodeposits as undercoats for paint. Electrotinned and electogalvanized steel. Test methods and results. (L17, L26, Sn, Zn, ST)

200-L. Detergents for Use in the Aluminium Industry. P. G. Clements. *Light Metals*, v. 14, Feb. 1951, p. 104-108.

Theory and practice of degreasing Al and its alloys with alkaline solutions. Equipment. (L12, Al)

201-L. Construction of a Small-Scale Sheet-Galvanizing Unit. M. L. Hughes and I. E. Thomas. *Journal of the Iron and Steel Institute*, v. 167, Jan. 1951, p. 46-47.

Small galvanizing unit, large enough to hold about 6 cwt. of zinc, constructed at the BISRA laboratories, was designed to galvanize sheets of 8-in. width and of any convenient length, in a manner essentially similar to that employed in industry. Sheets were successfully galvanized at various speeds, bath temperatures, and bath compositions. (L16, Zn, CN)

202-L. A Survey of Coating-Thickness Variation on Commercially Galvanized Sheets. M. L. Hughes. *Journal of the Iron and Steel Institute*, v. 167, Jan. 1951, p. 48-65.

Distribution of coating thickness on representative samples of commercially galvanized steel sheets was studied. Results of measurements along, across, and upon either side of the sheets, and the probable re-

lationship between different types of thickness variation and existing techniques of galvanizing.
(L16, S14, Zn, CN)

203-L. Ceramic and Metallic Bodies. (In German.) Friedrich Reinhart. *Sprechsaal für Keramik; Glas; Email,* v. 84, Jan. 10, 1951, p. 5-7.
Patented methods of coating ceramic articles with precious metals or their alloys. (L general, EG-c)

204-L. Methods for Evaluating the Quality of Anodic Oxide Castings. (In Italian.) G. Missier and W. Ruff. *Alluminio,* v. 19, No. 6, 1950, p. 515-522.
Experimental investigation of different methods for determining thickness and durability of anodic oxide coatings on Al. (L19, S14, Al)

205-L. Chemical Oxidation of Aluminum and Its Alloys. (In Italian.) *Alluminio,* v. 19, No. 6, 1950, p. 569-575.
Various processes for producing protective oxide coatings by chemical treatment. Details of time, temperature, and bath composition. 18 ref. (L14, Al)

206-L. Diffusion of Hydrogen in Steels of Different Carbon Contents During Acid Etching (In Russian.) S. A. Balezin and D. Ya. Solovei. *Doklady Akademii Nauk SSSR,* (Reports of the Academy of Sciences of the U.S.S.R.), new ser., v. 75, Dec. 21, 1950, p. 811-814.
Several pickling inhibitors, including thiourea, diethyl aniline, thiodiglycol, etc., were investigated for steels containing 0.14-1.20% C and nominal percentages of Si, Mn, S, and P. (L12, N1, CN)

207-L. Hot Paint Spraying Saves Finishing Materials, Labor. Henry J. Holtz. *Steel,* v. 128, Mar. 12, 1951, p. 85-86.
As applied to metal finishing.
(L26)

208-L. Composite Metal Fabrication by Arc Welding. H. E. Cable. *Welding Journal,* v. 30, Mar. 1951, p. 258-262.
Several examples of surfacing of bearings for resistance to galling, and for resistance to corrosion.
(L24, T7)

209-L. Removing Discoloration From Stainless Steel. *Welding Journal,* v. 30, Mar. 1951, p. 271.
Simple electrolytic apparatus.
(L13, SS)

210-L. Steel Warehouse Building Flame Cleaned Without Necessity for Work Shutdown. *Welding Journal,* v. 30, Mar. 1951, p. 272.
Illustrated. (L10, CN)

211-L. Automatic Transmission Castings Cleaned Chemically. R. J. Peters. *Iron Age,* v. 167, Mar. 15, 1951, p. 105-107.
New adaptation of the Kolene cleaning technique which produces gray iron castings of unusual surface quality. Surface sand inclusions are dissolved, and all scale and rust are removed. Machine-shop rejects are minimized, since the process uncovers porosity and cracks for visual inspection. (L12, SI)

212-L. National Bureau of Standards Opens New Laboratory for Durability Studies of Protective Coatings. *Better Enameling,* v. 22, Mar. 1951, p. 22-23.
(L27, A9)

213-L. Availability of Finishes for Die Castings. *Die Castings,* v. 9, Mar. 1951, p. 20-21, 60.
Various types and their availability during the emergency. Mentions mainly Zn die castings.
(L general, Zn)

214-L. Chemically-Inert Synthetic Enamel Required for Microscopes. Charles Hendershott. *Die Castings,* v. 9, Mar. 1951, p. 27, 34.
Finishing procedures for Al and Zn die castings used in Bausch & Lomb microscopes. (L26, Al, Zn)

215-L. Abrasive Blast Plus Anodizing Yields Inert, Uniform Surface. J. E. Willing. *Die Castings,* v. 9, Mar. 1951, p. 33, 60.
Application to diecast Al parts for railway-signal equipment.
(L10, L19, Al)

216-L. How an Organic Coating Solved a Design Problem at Philco. *Die Castings,* v. 9, Mar. 1951, p. 36-38, 63.
Difficulty encountered in matching color among five brass-plated Zn die castings resulted in a change to a metallic hammertype baked enamel. This solved the color matching problem, eliminated rejects, saved polishing, and stepped up production rate. (L26, Zn, Cu)

217-L. Foundry Cleaning Costs Cut $250 Per Day. *Steel,* v. 128, Mar. 19, 1951, p. 76.
Table-room rotoblast unit cleans large castings at savings over former methods of $150 per day in breakage and $11.20 in labor.
(L10, E24, CI)

218-L. Hardfacing—a Design Tool. J. J. Barry. *Machine Design,* v. 23, Mar. 1951, p. 114-119.
Hard facing has always been considered as a maintenance and repair process rather than a design tool. Shows that the process is also of value in production of miscellaneous items in which a wear resistant surface is desirable. Recommended procedures and applications, including recommendations for alloy selection. (L24, SG-m)

219-L. Metal Colouring; Methods of Treatment for Iron and Steel Smallware. C. Harris. *Metal Industry,* v. 78, Feb. 23, 1951, p. 143-146.

Details of various formulas. (L14, Fe, ST)

220-L. Magnesium Alloy Surface Treatment; Importance of Chemical Buffering. L. F. Le Brocq. *Metallurgia,* v. 43, Feb. 1951, p. 53-61.

Good buffering power is an important practical requirement for chromate treatment baths for the protection of Mg alloys. Buffering properties of the hot ½-hr. chromate bath at pH 6. Good buffering of a cold chromate bath at pH 4 to 5 can be obtained by addition of chrome alum or preferably potash alum. Action of alkali on potash alum. (L14, Mg)

221-L. What Are the Advantages of Special Coating the Interior of Boilers and Tenders as Well as the Exterior of Flues and Tubes? Edward H. Heidel. *Proceedings, Master Boiler Makers' Association,* 1950, p. 132-138; disc. p. 138-145.

Atmospheric and interior boiler-water corrosion and experiences of different railroads. Recommended procedure for application of protective paint coatings. Requirements which suitable coatings for the different locations must fulfill. (L30, R3, R4, ST)

222-L. Plated Aluminum. M. G. Corson. *Metal Progress,* v. 59, Mar. 1951, p. 412, 414. (Translated and condensed from "Influence of Hard Chromium Plating on the Fatigue Strength of Aluminum Alloys", Ernst Raub.)

Previously abstracted from *Metallforschung.* See item 8-166, 1947. (L17, Q7, Al, Cr)

223-L. Coatings for Protection of Steel in Water. G. W. Oxley. *Paint and Varnish Production,* v. 41, Mar. 1951, p. 10-13.

Variable conditions in underwater service; types of coatings for such service; and results of laboratory and field experiments on various types. Use of bituminous coatings. 14 ref. (L26, ST)

224-L. The Role of the Vehicle in Paints for Submerged Surfaces. A. C. Elm. *Paint and Varnish Production,* v. 41, Mar. 1951, p. 14-16, 36-37.

Previously abstracted from *Paint, Oil & Chemical Review.* See item 198-L, 1951. (L26)

225-L. Importance of Surface Preparation for the Protection of Metals. A. J. Liebman. *Paint and Varnish Production,* v. 41, Mar. 1951, p. 18-22, 37.

See abstract of "Surface Preparation Values and Sandblasting Economics," *Organic Finishing,* item 825-L, 1950. (L10, CN)

226-L. Protective Coating for Submersible Type Transformers and Network Protectors. V. A. Veit. *Paint and Varnish Production,* v. 41, Mar. 1951, p. 24-28.

Equipment is installed in street manholes and the paint coatings fail quite rapidly because of salt used to clear ice and snow. Materials of construction are mild steel or Cu-bearing steel. Special paint-test procedure developed, also some experiments with cathodic protection. (L26, R10, ST)

227-L. The Manufacture of Metal Diaphragms Having Very Accurate Perforations. D. C. Gresham. *Process Engraver's Monthly,* v. 58, Feb. 1951, p. 42, 45.

Process as applied to Cu sheets about 0.012 in. thick. The sheets are first coated with bakelite resin and bichromated gum, then placed between two negatives of the design to be etched, and exposed to high-intensity light source. Unprotected areas of resin are dissolved leaving a resin resist on both sides, where the holes are to be made. A thin layer of Ni is then electrodeposited on the unprotected areas of Cu, followed by removal of the resin resist in boiling caustic. Finally, the plate is put in a Cu-plating bath which etches the spots not previously plated with Ni through from both sides until the desired holes are produced. (L17, L26, Cu)

228-L. Derusting Equipment in the Field. The Use of Iodine as a Pickling Acid Inhibitor. Karl F. Hager and Morris Rosenthal. *Ordnance,* v. 35, Mar.-Apr. 1951, sec. 1, 479-480.

Experiments show that small ordnance items may be derusted quickly and easily even under field combat conditions. Tincture of iodine or iodine crystals are added to H_2SO_4 solution. Other acids may be substituted. (L12, Fe, ST)

229-L. Industrial Uses of Ultrasonics. G. E. Henry. *General Electric Review,* v. 54, Mar. 1951, p. 32-35.

Various possible fields of application, with special attention to the industrial cleaning of metal parts. (L12)

230-L. Data on Dry Coloring Metallics. Lawrence S. Krieger. *Plastics Industry,* v. 9, Mar. 1951, p. 20.

Dry coloring of metallic powders has been somewhat retarded because of belief that they are explosive. If the proper metallic pigment is used, and toned to the color desired with the correct pigment toners, and each particle of this mixture is coated

with the proper wetting agent for insurance against sparking, no trouble will be encountered. (L26, H11)

231-L. Studies on Fishscale of Porcelain Enamel. Ikutaro Savai, Megumi Tashiro and Tadashi Yasui. *Finish,* v. 8, Apr. 1951, p. 33-37.

In order to produce "fish scales" artificially, the authors treated steel plate, one side of which was coated with different kinds of enamels, with H_2SO_4. The volume of hydrogen liberated at the enameled side was measured by displacement of mercury. Tests were made with ground coat, antimony, and titanium cover coat applied over ground coat, each with different application weights. (L27, CN)

232-L. Effect of Bath Composition on Aluminum Coatings on Steel. D. O. Gittings, D. H. Rowland, and J. O. Mack. *Industrial Heating,* v. 18, Mar. 1951, p. 448, 450, 452. (A condensation.)

Previously abstracted from *American Society for Metals,* Preprint No. 3, 1950. See item 741-L, 1950. (L16, ST, CN, Al)

233-L. Flow Coating in the Home Appliance Field. C. O. Hutchinson. *Finish,* v. 8, Apr. 1951, p. 26-28, 59.

The process, materials and equipment requirements, and control factors. (L26)

234-L. Keep It Clean. *Modern Industry,* v. 21, Mar. 15, 1951, p. 52-54.

Mechanized methods for degreasing, blasting, washing, pickling, etc., of metal parts. (L10, L12)

235-L. Finishing Floor Registers and Grilles at the Auer Register Company. Ezra A. Blount. *Products Finishing,* v. 15, Mar. 1951, p. 10-19.

Equipment and procedures for spraying synthetic enamel. The products are fabricated from steel, monel metal, aluminum, bronze, or stainless steel. (L26, ST, Ni, Al, Cu, SS)

236-L. The Electrodeposition of Iron. A. D. Squitero. *Products Finishing,* v. 15, Mar. 1951, p. 22-24, 26, 28, 30, 34, 36, 38, 40, 42, 44.

Methods, for bath compositions and operating conditions; applications. It can replace Ni and Cu in many applications for electroforming, salvage, repair, wear resistance, and as an undercoating for other deposits. 11 ref. (L17, L18, Fe)

237-L. Fundamentals of Electrocleaning. Allen G. Gray. *Products Finishing,* v. 15, Mar. 1951, p. 54, 56, 58, 60, 62, 66, 68, 70. (Based on paper by Gerald A. Lux.)

Basic requirements of a good electrocleaner; proper methods for its use. (L13)

238-L. The Use of Ethyl Silicate in Providing Heat-Resistant Coatings of Aluminium on Steel. G. Tolley. *Journal of Applied Chemistry,* v. 1, Feb. 1951, p. 86-90.

The doping of sprayed Al with ethyl silicate was found to give a heat resistant coating which needs no heat treatment before putting into service. This coating is compared with aluminizing, and the relative protection given by these two coatings to mild steel from 700 to 950° C. was determined. (L23, Al, ST)

239-L. Primer Paints for Structural Steel. S. C. Frye. *American Paint Journal,* v. 35, Mar. 26, 1951, p. 70-71, 74-75.

Includes surface-preparation recommendations. (L26, CN)

240-L. Finishing Military Aircraft. Part III. Priming and Painting. Gilbert Close. *Industrial Finishing,* v. 27, Mar. 1951, p. 52-54, 56, 58, 60, 62.

Recommended procedures. Special requirements intrduced by high air velocities and extreme temperatures. (L26)

241-L. Bakes Different Finishes on Variety of Metal Parts. Harry Miller. *Industrial Finishing,* v. 27, Mar. 1951, p. 66-68.

Oil-burner parts made of sheet steel, sheet Al, and cast Al are cleaned, painted in one of three different finishes; all are sent through the same oven, some at one level, others at another, to take care of the different baking heats required. (L26, ST, Al)

242-L. Heat Resistant Ceramic Coatings Permit Substitutes for Critical Materials. Dwight G. Bennett. *Materials & Methods,* v. 33, Mar. 1951, p. 65-67.

Recently developed ceramic coatings which make possible the high-temperature use of noncritical iron and low-carbon steel, and provide additional protection for heat resistant alloys. (L27, CI, CN)

243-L. Preparing Zinc-Base and Aluminum-Base Die Castings for Finishing. D. F. Seymour. *Materials & Methods,* v. 33, Mar. 1951, p. 68-69.

Recommendations for cleaning and surface conditioning of die-cast parts, which is frequently required before finishing to improve corrosion resistance or appearance. (L12, Zn, Al)

244-L. Heat Reflected and Conserved by Aluminum Paint Coatings. G. M. Babcock and F. B. Rethwisch. *Heating and Ventilating,* v. 48, Mar. 1951, p. 68-69.

Value of Al paint coatings for heat reflection and conservation. (L26, Al)

245-L. High Vacuum Evaporated Optical Coatings. Robert E. Frazer. *Instruments,* v. 24, Mar. 1951, p. 284-285, 322-324.

Methods for producing metallic mirrors by vacuum evaporation and deposition. Corrosion resistance, mechanical stability, and reflectivity of the various types. (L25)

246-L. Electric Metallic Tubing Given Protective Coatings. *Iron Age,* v. 167, Mar. 29, 1951, p. 96.

Steel conduit is now being given a complete exterior and interior surface finish at the Etna, Pa., plant of National Supply's Spang-Chalfant Division. Exterior coating is electroplated Zn; interior coating is sprayed lacquer. (L17, L26, ST, Zn)

247-L. Swirl Method for the Evaluation of Metal Cleaners. Robert H. Tiers. *Metal Finishing,* v. 48, Sept. 1950, p. 56-60.

Test procedure. Development of a standard "soil." Soil mixtures are applied to weighed steel panels. After re-weighing the panels plus soil, they are attached to a shaft which is rotated by a small motor. The panels are rotated in a solution of the cleaner to be evaluated. Soil weight loss is determined and computed as percentage. (L12)

248-L. Water Displacing Fluids. *Metal Finishing,* v. 48, Sept. 1950, p. 61-63.

Platers who have used these materials have found them indispensable in overcoming certain production problems. Application to plating and finishing procedures. Apparatus. (L17)

249-L. A Plating Success Story; Harding Manufacturing Company. Edward Finnie. *Metal Finishing,* v. 48, Sept. 1950, p. 64-65, 83.

Equipment and procedures of Detroit firm for plating of Al, Ni, Cr, Zn, Cd on miscellaneous parts and equipment. (L17)

250-L. Complex Compounds in Industrial Electroplating. Part II. Seymour Senderoff. *Metal Finishing,* v. 48, Sept. 1950, p. 71-78.

Comprehensive review of the role of complex compounds in Cr, Zn, Cd, Sn, Pb, In, Ag, Au, Pt, Rh, brass, speculum (Sn-Cu), terne plate (Pb-Sn), and miscellaneous alloy plating. Topics for further study. 97 ref. (L17, EG-a)

251-L. Calculating Metal Cost in Copper Plating. *Metal Finishing,* v. 48, Sept. 1950, p. 84.

A chart. (L17, Cu)

252-L. Barrel Plating of Lead-Tin Alloys. L. H. Seabright. *Metal Finishing,* v. 48, Oct. 1950, p. 54-56, 72.

Recommended bath compositions and operating conditions for deposits varying from 5-95 to 60-40 Sn-Pb. Solution-control analytical methods. (L17, Pb, Sn)

253-L. Practical Electropolishing of Stainless Steel. Fred G. Brune. *Metal Finishing,* v. 48, Oct. 1950, p. 57-62, 112. (L13, SS)

254-L. Continuous Galvanizing by the Sendzimir Process. K. Oganowski. *Metal Finishing,* v. 48, Oct. 1950, p. 63-68.

See abstract of "Armco Takes Wraps Off Sendizimir Galvanizing Process," *Iron Age,* item 391-L, 1950. (L16, Zn, ST)

255-L. Sprayed Metal Coatings for Corrosion Protection. G. Tolley. *Metal Finishing,* v. 48, Oct. 1950, p. 69-72.

Separate sections deal with sprayed Zn, Cd, and Al coatings. Other sprayed-metal coatings are briefly mentioned. (L23, Zn, Cd, Al, ST)

256-L. The Navy's Newest Electroplating Shop. George W. Grupp. *Metal Finishing,* v. 48, Nov. 1950, p. 56-57.

Shop at the U. S. Ordnance Test Station, Inyokern, Calif. (L17)

257-L. Vacuum Plating of Metals and Plastics. T. M. Navoy. *Metal Finishing,* v. 48, Nov. 1950, p. 58-60.

Fundamental principles, procedures, equipment and its maintenance, and costs. (L25)

258-L. New Hard Finish for Aluminum Alloys. *Metal Finishing,* v. 48, Nov. 1950, p. 61-63, 74.

Electroplating procedure known as "MHC" developed at Glenn L. Martin Co., Baltimore, for supplying a nonmetallic, file-hard, highly heat-refractive surface to a wide variety of Al alloys containing less than 5% Cu. Composition of the deposit or of the plating bath is not disclosed. Properties and applications of the coating. (L17, Al)

259-L. The Dressing, Heading and Care of Polishing Wheels. A. M. Brown. *Metal Finishing,* v. 48, Nov. 1950, p. 64-67. (L10)

260-L. Additive Compounds in Electroplating Baths. Part III. Marvin Rubinstein. *Metal Finishing,* v. 48, Nov. 1950, p. 68-74.

Mechanics of operation of wetting agents, addition salts, and sequestering agents. (To be continued) (L17)

261-L. Development of Metal Cleaners Using Radioisotopic Evaluation Methods. J. C. Harris and R. E. Kamp. *Metal Finishing,* v. 48, Nov. 1950, p. 75-78.

Radioisotopic tracer method for

determination of soil removal combined with a dilution technique which has proved suitable for the evaluation of combinations of various surface-active agents and alkalies. (L12)

262-L. Electroplating on Aluminum. R. H. Keller. *Metal Finishing,* v. 48, Dec. 1950, p. 56-64.

History of commonly used methods for the benefit of the practical plater, theory of the processes used, and some of the difficulties encountered. 45 ref. (L17, Al)

263-L. Silvering Plastics. Isidore Cross. *Metal Finishing,* v. 48, Dec. 1950, p. 77-81.

Two methods are by simultaneous spraying of ammoniacal $AgNO_3$ and a suitable reducer through a dual-nozzle air gun; and by immersion in a solution containing the same materials. The finish produced is known as a silver mirror. Equipment and solution recipes. (L16, L23, Ag)

264-L. Hot-Dip Galvanizing of Powder Iron Compacts. H. Bablik, F. Götzl and P. Kukaczka. *Sheet Metal Industries,* v. 28, Mar. 1951, p. 277-281.

Experimental work using samples which contained 0-0.9% C. 18 photomicrographs show structures of the bonds obtained under different circumstances. Procedures found to give satisfactory results. (L17, Zn, Fe)

265-L. Some Details of Lithographical Reproduction on Vitreous-Enamelled Surfaces in Monochrome and Multicolour. A. J. Dodd. *Sheet Metal Industries,* v. 28, Mar. 1951, p. 282-287. (L27)

266-L. Steel Pellets. J. E. Hurst. *Iron and Steel,* v. 24, Mar. 1951, p. 87-88.

British hard-drawn product for cleaning and peening. (L10, G23, ST)

267-L. Metal Colouring; Methods of Treatment for Aluminium and its Alloys. C. Harris. *Metal Industry,* v. 78, Mar. 9, 1951, p. 183-185. (L14, Al)

268-L. From a Metallurgist's Notebook: Defective Silver-Plated Spoons. H. H. Symonds. *Metal Industry,* v. 78, Mar. 16, 1951, p. 205-207.

Methods of examination used to trace the cause of defective areas on silver-plated spoons. Includes micrographs. (L17, Ag)

269-L. Detergency in Electroplating. Foster Dee Snell. *Metal Industry,* v. 78, Mar. 16, 1951, p. 211-213.

Current practice in the use of alkaline, emulsion, and solvent cleaners in the American metal-finishing industry. 15 ref. (L12)

270-L. The Formulation of Anti-Corrosive Compositions for Ship's Bottoms and Underwater Service on Steel. *British Iron and Steel Research Association,* First Report of Joint Technical Panel N/P2, Jan. 1950, 26 pages.

Follows up the work of Fancutt and Hudson on anti-corrosive compositions with an investigation of new formulations designed to combine the advantages of the two most promising compositions. Protective properties and adaptability of compositions for applications to new construction. Deals with anti-corrosive compositions pigmented with combinations of basic lead sulfate/white lead/extender and basic lead sulfate/Al-powder/extender. Tests were made to develop a standard surface-preparation procedure for steel specimens used for the trials. (L26, CN)

271-L. Spectrographic Analysis of Surface Metallic Layers Obtained by Thermal Diffusion of Chromium in Iron and Steel. (In French.) Frima Malamand. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Jan. 15, 1951, p. 236-238.

Charted data for Cr content vs. depth correspond very closely to theoretical calculation on the basis of diffusion theory for commercial conditions of chromizing (vapor phase at 1100° C.). (L15, Fe, ST, Cr)

272-L. A Study of the Electrostatic Spray-Coating Process. Part I. (In Japanese.) Susumu Yoshida, Shigetake Okamoto, and Kiyoshi Tamura. *Journal of Mechanical Laboratory,* v. 4, No. 6, Oct. 1950, p. 224-231.

Experimental work to determine fundamental conditions for carrying out the process and to investigate its mechanism. Samples were rectangular metallic plates, pipes, and various parts of bicycle bodies. It was found that efficiency of spraying could be raised to as high as 50-60% with an electrostatic field, as compared to 20-30% without field. Influences of electrostatic field on hardness, adhesion, and gloss of paint films. Size distribution of paint particles which had passed through an electric field was determined by means of a string electrometer. 10 ref. (L26)

273-L. The Barrel Plating Method for Chromium. I. Research on the Plating Solution. (In Japanese). Matsuhei Kishi. *Journal of Mechanical Laboratory,* v. 4, No. 6, Oct. 1950, p. 232-235. (L17, Cr)

274-L. Metal Evaporator Uses High-Frequency Heating. Robert G. Picard and J. E. Joy. *Electronics,* v. 24, Apr. 1951, p. 126-128.

Elimination of conventional metal-heating filament makes it possible to convert more metals to the vapor state and deposit them on nonconducting materials. Surface contamination is avoided. Further progress depends on the development of better crucibles. (L25)

275-L. Spray Painting of Royal Vacuum Cleaners. W. A. Raymond. *Organic Finishing,* v. 12, Mar. 1951, p. 17-18, 21.

How metal parts of widely varying shapes can be spray painted automatically and economically. (L26)

276-L. Baking Finishes by Induction Heating. Frank Netschert. *Organic Finishing,* v. 12, Mar. 1951, p. 23-24.

See abstract of "Finishes Successfully Baked on Nonferrous Products by Induction Heating," *Materials & Methods,* item 701-L, 1950. (L26. Al, Cu)

277-L. What Platers Can Do About the Nickel Shortage. *Steel,* v. 128, Apr. 2, 1951, p. 81-83.

Substitute plating and coating techniques available where restrictions on Ni for plating make conventional Cu-Ni-Cr finishes impossible. (L17, Ni)

278-L. Chemical Deposition of Silver on Nonconductive Bodies. John T. Owen. *Plating,* v. 38, Apr. 1951, p. 353-357.

As accomplished by the spray method. Because of the analogies, the preparation of solutions and objects for other methods is also described. (L23, Ag)

279-L. Cleaning and Preparation of Metals for Electroplating. II. Soiling and Cleaning Procedures. Henry B. Linford and Edward B. Saubestre. *Plating,* v. 38, Apr. 1951, p. 367-375.

Nature of the problem of soiling and cleaning metals in the laboratory. The cleaners, soils, and metals to be used; shape and size of panels used and the equipment necessary for the preparation of the samples. A standardized process for pre-cleaning, soiling, and cleaning panels prior to testing. Gravimetric data on amount of soil present under standard conditions, and effect of several operating variables. (L12)

280-L. Makes a Big Business of D-Enameling. Arthur M. Lander. *Ceramic Industry,* v. 56, Apr. 1951, p. 102-103, 163.

Enamel stripping process and equipment used by New Process D-Enameling Corp., Chicago. They provide an enamel-removal service for rejects of other manufacturers. (L12)

281-L. The Electrodeposition of Copper-Lead Alloys. A. L. Ferguson and Nelson W. Hovey. *Journal of the Electrochemical Society,* v. 98, Apr. 1951, p. 146-154.

A number of solutions from which Cu-Pb alloys might be deposited were investigated. The most promising of these, a cyanide-tartrate solution, was studied in detail. Effects on alloy composition, single-metal potentials, and alloy potentials were determined for all of the possible variables, using a rotating-cathode setup. 11 ref. (L17, Cu, Pb)

282-L. Aging Effects in Copper-Lead Alloy Plating Solutions of the Cyanide-Tartrate Type. Nelson W. Hovey, Albertine Krohn, and A. L. Ferguson. *Journal of the Electro-Chemical Society,* v. 98, Apr. 1951, p. 155-159.

Studied during a 50-day period by measurements of single-metal potentials, static and dynamic alloy potentials, oxidation-reduction potentials, alloy compositions, and absorption spectra of the plating solution. Similar measurements on a portion of the solution stored under nitrogen established atmospheric oxidation as the cause of aging. (L17, Cu, Pb)

283-L. Cost-Saving Tips on Blast Cleaning. *SAE Journal,* v. 59, Apr. 1951, p. 46-48. (Excerpts from "Operation of Blast Cleaning Equipment," Max R. Wiard.)

Recommendations based on experiences of Campbell, Wyant & Cannon Foundry Co. (L10)

284-L. Phosphating Cleaner Cuts Finishing Costs. *Iron Age,* v. 167, Apr. 5, 1951, p. 108.

Use of material known as Klem-Kote, which cleans metal, and deposits a phosphate coating at the same time. (L12, L14, CN)

285-L. Electrically Fired Galvanizing. C. C. Roberts. *Instrumentation,* v. 5, 1st qtr. 1951, p. 33-34.

Equipment and temperature controls. (L16, Zn, ST)

286-L. Porcelain Enamel as a Corrosion Resistant Coating for Metals. G. H. McIntyre. *Corrosion* (Technical Section), v. 7, Apr. 1951, p. 118-122; disc. p. 122-123.

Use of porcelain enamel as a decorative finish as contrasted to its more recent use as a corrosion resistant coating. Properties of different types of enamels as regards methods of application and resistance to acid, weather, water, inorganic salts, and other chemicals. Some specific applications for corrosion resistance. Resistance to impact damage. (L27, R general, CN)

287-L. Coated Abrasives in the Grinding & Polishing of Stainless Steel. Part A. Prior to Fabrication.

Electroplating and Metal Finishing, v. 4, Mar. 1951, p. 77-80.

Sheet, bar, strip, cylinder, and tube forms. Recommendations for abrasive selection, equipment, and procedures. (L10, SS)

288-L. Molybdenum in Metal Spraying by the Wire Process. Part 2. R. Corbett. *Electroplating and Metal Finishing,* v. 4, Mar. 1951, p. 84-88.

The adhesion of sprayed steel to Mo coatings, the heat treatment of Mo coatings, and the spraying of Mo onto base metals other than steel. Includes photomicrographs. (L23, Mo, ST)

289-L. Periodic Reverse Plating of Nickel and Cobalt. *Electroplating and Metal Finishing,* v. 4, Mar. 1951, p. 89-90.

A process using a cathodic time interval of about 1/5 sec. and an anodic interval of about 1/25 sec. (L17, Ni, Co)

290-L. Electrogalvanising and Painting Steel Window Frames. Alan Smart. *Electroplating and Metal Finishing,* v. 4, Mar. 1951, p. 95-96; disc. p. 96-97.

A Scottish plant illustrates factors influencing the design of automatic plating plant. (L17, L26, ST)

291-L. Recent Metallizing Developments. Thomas A. Dickinson. *Steel Processing,* v. 37, Mar. 1951, p. 122-125.

An illustrated survey. (L23)

292-L. Removal of Scale by Using Induction Heat. C. O. Parish and H. F. Kincaid. *Steel Processing,* v. 37, Mar. 1951, p. 140.

Technique for removing scale rapidly from round steel bars with induction heat. Coil arrangement and mechanized conveyor for automatically moving bars through the inductor where the surface is exposed to induced high-frequency currents. (L10)

293-L. Aluminum Coating on Steel. *Canadian Metals,* v. 14, Mar. 1951, p. 39-40.

Coatings formed by hot dipping, spraying, calorizing, cladding, and casting (Alfin process). (L general, Al, ST)

294-L. Metal Finishing Plastics by Vacuum Coating. L. Holland. *British Plastics,* v. 24, Mar. 1951, p. 96-102.

Equipment, the process and typical applications. 20 ref. (L25)

295-L. Selection of Materials for Anodizing (In French and German.) E. Zurbrügg. *Aluminium Suisse,* Jan. 1951, p. 17-26.

The Al alloy to be anodized depends on the prime purpose of anodizing and the ultimate use of the product. Includes photographs in black-and-white and in color. (L19, Al)

296-L. Modern Methods of Copper Plating Iron and Steel and of Nickel Plating Copper Alloys (Copper, Brass, Bronze). (In French and German.) Roger Zirilli. *Pro-Metal,* v. 4, Feb. 1951, p. 778-792.

Preliminary surface preparation of the articles to be plated; advantages and disadvantages of acid and cyanide baths; purpose of Cu plating as a base for Ni plating; plating equipment; thickness of Cu plate; the Cu plating of porous materials; final treatment of Cu plated articles, and a tabular list of defects, possible causes, and remedies. (L17, Cu, Ni, Fe, ST)

297-L. Insulation of Magnetic Sheet Metal by Means of a Mica-Phosphate Layer (In German.) A. Wüstefeld. *Werkstoffe und Korrosion,* v. 2, Jan. 1951, p. 16-17.

Process in which a pasty mass of ground mica and highly acid phosphate solution is applied to sheet steel. The applied layer resists a potential of more than 120 volts, and will remove rust as well as protecting the metal from rusting. (L14, ST, SG-p)

298-L. Chemical Coloring (Patina Formation) on Metallic Artistic and Useful Articles. (In German.) H. Krause. *Metalloberfläche,* v. 3, ser. B, Jan. 1951, p. 1-3; Feb. 1951, p. 22-24.

The various types of patina which form naturally on Cu and its alloys in different atmospheres. Second installment: suggestions for testing of specific metals and alloys for ability or tendency to form a patina. (L14, Cu)

299-L. Plant Observations on a Potassium Cyanide Copper Bath. (In German.) W. Savelsberg. *Metalloberfläche,* v. 3, ser. B, Jan. 1951, p. 4-6.

Causes of formation of pores and bubbles in copper electrodeposits were investigated. Deposition potentials of different electrolytes were measured. (L17, Cu)

300-L. Electrolytic Removal of Galvanic Deposits. (In German.) A. Pollack. *Metalloberfläche,* v. 3, ser. B, Jan. 1951, p. 8-9.

Procedures for removal of Ni, Cu, Sn, Cr, and Ag electrodeposits. (L17, Ni, Cu, Sn, Cr, Ag)

301-L. Insufficient or Excess Deposition of Silver on Tableware. (In German.) Carl Schaarwächter. *Metalloberfläche,* v. 3, ser. B, Feb. 1951, p. 17-18.

Use of continuous control and inspection of the plating process to avoid insufficient or excess deposition. (L17, Ag)

302-L. Hot-Tinning of Cast Iron. (In German.) *Metalloberfläche,* v. 3, ser. B, Feb. 1951, p. 19-21.

Successful methods of tin plating. (L16, Sn, CI)

303-L. Use of Protective Atmosphere in Metal Spraying: (In German.) *Metalloberfläche,* v. 5, ser. A, Feb. 1951, p, 28-30.

An exchange of correspondence on "Problems in the Technique of Metal Spraying," by Püschel, (Sept. 1950 issue, item 793-L, 1950), between Dr. Püschel and Hans Biel. (L23)

304-L. Cleaning Ingots and Rolled Stock. (In German.) Heinrich Rübmann. *Stahl und Eisen,* v. 71, Mar. 15, 1951, p. 288-293; disc. p. 293-294.

Various methods and equipment for cleaning, which is done primarily to prevent defects upon rolling ferrous ingots. (L10, L12, F21, ST)

305-L. Textured Organic Coatings. Lester Back. *Product Engineering,* v. 22, Apr. 1951, p. 129-136.

New one and two-coat spray application "special effect" finishes for metals which are rapidly supplanting older types. Application characteristics, appearance, and film properties compare favorably with the usual protective enamels. Includes illustrations in color and a folded chart. (L26)

306-L. Flock Finishing. *Die Castings,* v. 9, Apr. 1951, p. 37-38, 40-42, 51, 61-63.

Processes, properties, and applications. (L26)

307-L. A Production Line Report: Several Finishes Applied by Versatile Plating Set-Up. *Die Castings,* v. 9, Apr. 1951, p. 44-45, 52.

Versatile production line of American Safety Razor Corp. which is capable of applying a variety of plated finishes to die-cast and stamped Zn or brass parts. (L17, Zn, Cu)

308-L. Metal Etching and Anodizing in Color. R. E. Pettit. *Products Finishing,* v. 15, Apr. 1951, p. 14-23, 26-28.

Equipment, procedure, and products of Chicago Thrift-Etching Corp. Metal etchings, identification plates, scales, rules, instrument dials and premium items, metal and plastic coin banks, and Al finishing by the Alumilite process (clear and in color) constitute products and activities. (L14, L19, Al)

309-L. Chlorinated Rubber Corrosion-Resistant Coatings. F. K. Shankweiler, G. N. Bruxelles, and R. E. Whitney. *Products Finishing,* v. 15, Apr. 1951, p. 28, 30, 34. (A condensation.)

Formulation of these coatings for protection of metal surfaces in various industries. (L26)

310-L. Chemical Surface Treatment Extends the Durability of Kool-Vent All-Weather Aluminum Awnings. Norman P. Gentieu. *Products Finishing,* v. 15, Apr. 1951, p. 38-43.

"Alodizing" process. (L14, Al)

311-L. Ironite Simplifies Paint Stripping Operation. Bert Doggett. *Products Finishing,* v. 15, Apr. 1951, p. 78, 80.

Use of proprietary material—Klem Stripper No. 74. (L12)

312-L. Metal Furniture Manufacturer Utilizes Power Brushing in Surface Preparation for Plating. *Products Finishing,* v. 15, Apr. 1951, p. 80, 82, 84. (L10)

313-L. Application of Organic Coatings to Metal. I. B. M. Letsky. *Paint Manufacture,* v. 21, Mar. 1951, p. 83-89, 109.

Several processes of dipping, tumbling, and spraying; some aspects of the Rotodip and Ransburg processes. Roller coating on metal, an important adjunct of the canning industry. (To be continued.) (L26)

314-L. Furan Resin Linings. R. McFarland. *Corrosion* (News Section), v. 7, Apr. 1951, p. 1-2.

Use as linings on cast iron and cast steel valve bodies. Table gives resistance to common commercial chemicals. (L26, CI)

315-L. Die Polishing Time Cut 10 Per Cent by Liquid Blasting. *Production Engineering & Management,* v. 27, Apr. 1951, p. 57.

Process developed by Pangborn Corp. and its application by Rockford Drop Forge Co. to reduce the time required to clean and finish forging dies. (L10, ST)

316-L. Removal of Stearic Acid From Surfaces by Alkaline Detergents. Fred Hazel and Wm. Stericker. *Industrial and Engineering Chemistry,* v. 43, Apr. 1951, p. 919-925.

Various alkaline chemicals used as cleaners were tested for their ability to remove "stearic acids" of different melting ranges from Zn, Al, steel, and—for comparison—glass surfaces. The results should be helpful in formulating polishing and buffing compounds and in setting up conditions for their removal from die castings. (L10, L12, Zn, Al, ST)

317-L. Protective Coatings Research by the Bureau of Ships. *Paint and Varnish Production,* v. 41, Apr. 1951, p. 13-16, 26.

Means for prevention of corrosion, deterioration, wear, and fouling. Methods include the application of electrochemical principles; coatings such as paints and organic preserv-

atives in liquid form; metallic and ceramic coatings.
(L general, T22, ST)

318-L. Cleaning and Finishing Stainless Steels. T. C. DuMond. *Materials & Methods,* v. 33, Apr. 1951, p. 93-104.
Manual, which covers the most common cleaning and finishing methods, indicates that stainless steels are not difficult to finish. Certain precautions. (L general, SS)

319-L. The Development, Production and Manufacture of Electro-Tinplate. W. E. Hoare. *Sheet Metal Industries,* v. 28, Apr. 1951, p. 309-321.
Commercial equipment and procedures. 34 ref. (L17, ST, Sn)

320-L. Surface Treatment and Finishing of Light Metals. Part 7. S. Wernick and R. Pinner. *Sheet Metal Industries,* v. 28, Apr. 1951, p. 373-379, 383.
Industrial anodizing of Al and its alloys and the chromic-acid processes. (To be continued.)
(L19, L14, Al)

321-L. Electroplating Aluminium and Aluminium Alloy Components. Part I. Study of Pretreatments and Dipping Processes. E. E. Halls. *Metal Treatment and Drop Forging,* v. 18, Mar. 1951, p. 125-131.
(To be continued.) (L17, Al)

322-L. (Book) **Metal Finishing Guidebook—Directory.** Ed. 19. 488 pages. 1950. Finishing Publications, 11 W. 42 St., New York 18. $2.50.
Finishing plant engineering, mechanical and chemical surface preparation, plating solutions, operating data, special plating procedures and surface treatments, control, analysis, and testing. Lists suppliers, manufacturers, trade names, consultants, schools, societies, etc.
(L general, A10)

323-L. (Pamphlet) **1950 Supplement to the Metal Cleaning Bibliographical Abstracts.** Jay C. Harris. *American Society for Testing Materials.* Special Technical Publication 90-A, 1950, 27 pages. $3.00.
Additional references for 1932-1948 and new references covering 1949-1950. (L10, L12)

324-L. (Pamphlet) **Twenty Years of Research for the Galvanizing Industry.** W. L. Hall and D. N. Fagg. 1950, 16 pages. Hot Dip Galvanizers Assn. Oxford, England.
Effect of temperature, immersion time, rate of withdrawal, additions to the bath, and base-metal composition on the reaction between the Zn and steel. Wrought and ingot iron and rimmed, balanced, and copper-bearing balanced basic open-hearth steel were investigated. dross formation and corrosion resistance of galvanized coatings.
(L16, Fe, ST, Zn)

325-L. (Pamphlet) **Tinplate Handbook.** W. E. Hoare. 1950, 31 pages. *Tin Research Institute,* Greenford, Middlesex, England; or 492 W. 6th Ave., Columbus 1, Ohio. Gratis.
World production, manufacture, grades, qualities, packing, ordering, testing, and applications.
(L16, L17, Sn)

326-L. Metal Finishing Progress in 1950. Walter A. Raymond. *Metal Finishing,* v. 49, Jan. 1951, p. 48-54.
110 references. (L general)

327-L. Metal Cleaning. D. W. Vance. *Metal Finishing,* v. 49, Jan. 1951, p. 55-57, 73.
Factors in selecting cleaners, solvent cleaners, emulsion and emulsifiable cleaners, alkaline cleaners, cleaning actions, electrocleaning, and acid cleaners. (L12)

328-L. Bright Chromizing—The Onera Process. Phillippe Galmiche. *Metal Finishing,* v. 49, Jan. 1951, p. 61-64.
See abstract of "Chromizing—Details of a Process for Forming Chromium-Rich Layers on Steel," *Sheet Metal Industries,* item 570-L, 1950.
(L15, ST, Cr)

329-L. The Effect of Operating Conditions on the Hardness of Chromium Plate. R. E. Howell. *Metal Finishing,* v. 49, Mar. 1951, p. 50-56, 69.
Reviews the literature and gives details of experimental work. In all cases, Cr was deposited on polished steel plates.
(L17, Q29, Cr, ST)

330-L. Strike Baths. J. B. Mohler. *Metal Finishing,* v. 49, Mar. 1951, p. 57-59, 69.
The basic plating cycle consists of the following steps: clean, rinse, etch, rinse, plate, and rinse. One of the common deviations is insertion of a "strike" step before the plate step to improve bond or covering power. This step consists of a flash deposit of another metal. The three basic types are the tin, copper, and silver strikes. (L17)

331-L. Anode Maintenance in the Alkaline Stannate Tin Plating Bath. F. A. Lowenheim. *Metal Finishing,* v. 49, Mar. 1951, p. 60-64.
Chemistry of this type of plating and recommendations for anode maintenance—an important factor in successful Sn plating. (L17, Sn)

332-L. Experiments in Chromium Plating From Non-Aqueous Media. A. L. Hanson, D. Frokjer, and D. Mitchell. *Metal Finishing,* v. 49, Apr. 1951, p. 48-49, 69.
Reviews literature and describes experimental work. Immediate objectives were to determine whether Cr in valences other than 6 can be used for electrodepositions and to

observe whether or not sulfate addition would be necessary. (L17, Cr)

333-L. The Function of Sulphites and Bisulphites in Cyanide Plating Solutions. Joseph Haas. *Metal Finishing,* v. 49, Apr. 1951, p. 64-65.

Fundamental chemistry of the above, and its application to plating practice. Applicable to deposition of Cu and Zn. (L17, Cu, Zn)

334-L. Manufacturing Applications of Liquid Impact Blasting. B. H. Marks. *Metal Treating,* v. 11, Mar.-Apr. 1951, p. 2-4; disc. p. 5. (L10)

335-L. Tomorrow's Products Tested Today. Warren W. Smith. *Organic Finishing,* v. 12, Apr. 1951, p. 13-16.

Test procedures and equipment for determining life of protective coatings and finishes at South Florida Test Service, Miami. (L26)

336-L. Finishing Metal Kitchen Cabinets. George K. Clapper. *Industrial Finishing,* v. 27, Apr. 1951, p. 28-30, 32.

Equipment and procedures of Alabama Metal Products Co. (L general, T10, ST)

337-L. Hot Synthetic Enamel Used For Painting Farm Tractors. Robert Johnson. *Industrial Finishing,* v. 27, Apr. 1951, p. 48-50, 52.

Equipment and procedures of Massey-Harris Co. (L26, ST)

338-L. High-Temperature Protection of a Titanium-Carbide Ceramal With a Ceramic-Metal Coating Having a High Chromium Content. Dwight G. Moore, Stanley G. Benner, and William N. Harrison. *National Advisory Committee for Aeronautics,* Technical Note 2329, Mar. 1951, 31 pages.

The ceramal contained 80% TiC and 20% Co. The coating, designated A-479M, contained 80% Cr and 20% alkali-free frit (glass). It was prepared as a slip, with clay as floating agent, and applied to the ceramal by dipping or spraying, then firing at 2000° F. for 10 min. in a purified H_2 atmosphere. Fired coating was hard, smooth, and adherent. (L27, Ti, Co, Cr, C-n)

339-L. Remarks on the Properties of Anticorrosive Pigments and Their Vehicles. Manfred Ragg. *Paint, Oil & Chemical Review,* v. 114, Apr. 12, 1951, p. 16-17, 28-30.

Fundamental mechanisms of action and practical properties of various types of pigments. Results of some new experiments. Concerned entirely with protection of iron and steel surfaces. (L26, CI, ST)

340-L. Hot Surface Marine Paint. Henning L. Warnecke. *Paint, Oil & Chemical Review,* v. 114, Apr. 12, 1951, p. 31, 34.

Problem of painting steel or cast-iron surfaces to withstand temperatures of 800-1300° F. Although there is no organic film-former or oil that will not disintegrate or carbonize at such temperatures, it is possible to apply a coating containing Al flake or Zn dust. If the surface has been properly prepared, the metallic particles will fuse into the base metal while the vehicle burns away, leaving a protective coating of Al or Zn. (L26, CI, ST)

341-L. Recent Developments in Metal Spraying by the Powder Process. W. G. McDermott. *Electroplating and Metal Finishing,* v. 4, Apr. 1951, p. 114-116, 131.

New features of the latest "Schori" metal-spraying gun, which produces denser, more adherent coatings of extremely low oxide content at much greater speed. Efficiency of deposition is increased and application costs lowered; while the new gun is capable of handling metals of high melting point which could not previously be sprayed by the powder process. (L23)

342-L. Brush-Backed Polishing. *Electroplating and Metal Finishing,* v. 4, Apr. 1951, p. 117-119.

New method of metal-surface preparation and its advantages. (L10)

343-L. Electrolytic Polishing of Aluminium. *Electroplating and Metal Finishing,* v. 4, Apr. 1951, p. 119.

Reviews recent British patent specification. (638,321.) (L13, Al)

344-L. Notes on the Production of Aluminium Reflector Surfaces. *Electroplating and Metal Finishing,* v. 4, Apr. 1951, p. 121-122.

Materials, mechanical polishing, degreasing and cleaning, electrolytic brightening, and rinsing. (L10, L12, L13, Al)

345-L. Coated Abrasives in the Grinding & Polishing of Stainless Steel. Part B. After Fabrication. A. E. Brown. *Electroplating and Metal Finishing,* v. 4, Apr. 1951, p. 123-126.

Restoration of the finish on small areas which have become marred during fabrication as a result of welding, tooling, machining, etc. (L10, SS)

346-L. Heavy Chromium Plating of Crankshafts. *Electroplating and Metal Finishing,* v. 4, Apr. 1951, p. 127-128.

Solutions and operating conditions used by a European plant. Two methods for stripping faulty deposits. (L17, Cr)

347-L. Removing Weld Discoloration. *Sheet Metal Worker,* v. 42, Apr. 1951, p. 40, 96.

A simple method designed for cleaning interior welded seams and corners of stainless steel. (L12, SS)

348-L. Pickling of Monel, Nickel, and Inconel. *Wire Industry,* v. 18, Apr. 1951, p. 365-367.

Suggested pickling solutions for various applications. (L12, Ni)

349-L. The Electrodeposition of Silver-Cadmium Alloys. Isvaran Nambissan and A. J. Allmand. *Transactions of the Faraday Society,* v. 47, Mar. 1951, p. 303-314.

Electrodeposition from complex cyanide solutions at controlled cathode potentials. The alloys used analyzed 1.6-100% Ag. Results are explained in terms of the deposition of primary lattices of α, ζ, δ, and ε types, depending on conditions. (L17, Ag, Cd)

350-L. Automatic Barrel Plating. *Metal Industry,* v. 78, Mar. 30, 1951, p. 247-250.

New British plant for Zn plating bolts, nuts, and screws. (L17, Zn, ST)

351-L. From a Metallurgist's Notebook: Enamel Adhesion. H. H. Symonds. *Metal Industry,* v. 78, Apr. 6, 1951, p. 270.

In order to ascertain reasons for exfoliation of enamel from motor-car nameplates, an investigation was made of possible causes. It was found that no flaws, laminations, or other defects existed; hence, the principal reason for exfoliation was poor quality of the enamel. The base metal contained about 90% Cu. (L27, Cu)

352-L. Lithium in Vitreous Enamels. S. Hallsworth. *Foundry Trade Journal,* v. 90, Apr. 5, 1951, p. 369-372.

See abstract under similar title from *Sheet Metal Industries,* item 153-L, 1951. (L27, ST)

353-L. The Alodine Process for Galvanic Protection of Aluminium. (In French.) Claude Hess. *Revue de l'Aluminium,* v. 28, Feb. 1951, p. 44-50.

Surface treatment for Al and its alloys, designed to facilitate the adhesion of paints. Surfaces are immersed in an acid bath containing essentially PO_4, F, and CrO_2 ions. The treatment is carried out without use of electric current. Mechanism of operation appears to consist in formation of a complex coating of alumina and Al salts. Laboratory tests show that this coating provides good protection against corrosion. 17 ref. (L14, Al)

354-L. Modern Methods of Copper-Plating Iron and Steel and of Nickel-Plating Copper Alloys (Copper, Brass, Bronze). Part II. Nickel-Plating Copper Alloys. (In French and German.) Roger Zirilli. *Pro-Metal,* v. 4, Apr. 1951, p. 811-820.

Operations and required equipment. Defects, possible causes, and remedies. (L17, Cu, Ni, Fe, ST)

355-L. The Problem of the Structure of Vapor-Deposited Iron Coatings. (In German.) Carl Heck. *Zeitschrift für Metallkunde,* v. 42, Jan. 1951, p. 10-13.

Structures differ with temperature of the material on which the Fe vapor is deposited. The deposit on a cold base consists partly of ferromagnetic and partly of nonferromagnetic particles; while deposits on a hot base consist entirely of ferromagnetic material. (L25, M27, Fe)

356-L. A Method for Determining the Cathodic Distribution of Current and Metal in Galvanic Electrolytes. (In German.) Julius Steiner. *Archiv für Technisches Messen,* Jan. 1951, T6-T7 (4 p.)

New method for determining the distribution of metal on the cathode. Criticizes earlier methods. (L17)

357-L. Chromium-Plating of Light-Metal Cylinders. (In German.) Erich Meyer-Rässler. *Metalloberfläche,* v. 3, sec. B, p. 33-42.

Procedures for producing hard Cr and porous Cr plating and their mechanical and thermal properties. 10 ref. (L17, T25, Al, Cr)

358-L. On the Blisters Produced on the Evaporated Aluminium Film. (In English.) Shigenori Nawata. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Apr. 1950, p. 331-340.

Comparative studies were made of continuous and discontinuous evaporation of thin Al films on glass. It was thus found that continuous evaporation is liable to produce blisters on the evaporated surface. Production of these blisters was studied. Recommendations for avoiding such blisters. (L25, Al)

359-L. Decorating Plastic Parts by Metallizing. *Automotive Industries,* v. 104, May 1, 1951, p. 54, 84, 86. (L23)

360-L. Improved Finishing Machine for Zn Base Die Castings. *Automotive Industries,* v. 104, May 1, 1951, p. 58.

The "Gyro-Finisher," a new abrasive tumbling machine developed by Ternstedt Div., General Motors Corp. (L10, Zn)

361-L. Surface-Preparation Values and Sandblasting Economics. A. J. Liebman. *Marine Engineering and Shipping Review,* v. 56, May 1951, p. 53-56.

Previously abstracted from *Organic Finishing.* See item 825-L, 1950. (L10, CN)

362-L. Liquid Impact Blasting of Die Casting Dies. B. H. Marks. *Die Castings,* v. 9, May 1951, p. 23-24, 26. (Based on "Manufacturing Application of Liquid Impact Blasting," *Tool Engineer).*

Previously abstracted from original. See item 169-L, 1951. (L10)

363-L. Barrel Finishing of Die Castings: A Survey of Materials, Methods, and Equipment. *Die Castings,* v. 9, May 1951, p. 39-40, 42-43, 46-50, 52-53, 68-69.

(L10)

364-L. HAE: Revolutionary New Coating for Magnesium. *Magazine of Magnesium,* May 1951, p. 1-3.

Electrolytic finish said to have excellent corrosion resistance, high melting point, good dielectric strength and hardness. It has a normally brown color of varying shades and is an excellent paint base. (L13, Mg)

365-L. Medalmaker Increases Production With Automatic Sandblasting Equipment. *Modern Machine Shop,* v. 23, May 1951, p. 224.

Use in production of medals, plaques, and medallions. (L10)

366-L. Ingenious Blast Cleaning Adapted to Mass Production. W. I. Gladfelter. *Iron Age,* v. 167, May 3, 1951, p. 100-104.

How special blast cleaning equipment has increased cleaning production as much as 40%. Two-speed drives on monorail conveyers through blast cabinets, multi-angle blast streams, and rotating tables are some of the ingenious equipment in use. (L10)

367-L. Substitute Protective Coating Materials for Bottle Caps and Jar Closures. Albin H. Warth. *Modern Lithography,* v. 19, May 1951, p. 61, 63. (L26)

368-L. Properties and Uses of Tin. W. H. Dennis. *Mine & Quarry Engineering,* v. 17, May 1951, p. 149-155.

Survey of fabrication procedures, with emphasis on electrodeposition and dip coating of tin on other metals. (L17, L16, Sn)

369-L. Chromium Plating of Large Drying Cylinders. A. H. Loveless. *Industrial Chemist and Chemical Manufacturer,* v. 27, Apr. 1951, p. 166-170.

Plant for Cr plating of large cast-iron cylinders. (L17, Cr, CI)

370-L. R-108—A New Concept in Protective Coating Intermediates. E. L. Tinnes and C. L. Chase. *Paint, Oil, & Chemical Review,* v. 114, Apr. 26, 1951, p. 14, 16-17.

Properties and formulation recipes for new material developed by General Electric Co. A high level of corrosion resistance is claimed. (L26)

371-L. The Use of Steel Shot in Airless Cleaning of Forgings. Nelson S. Mosher. *Steel Processing,* v. 37, Apr. 1951, p. 175-178, 205.

Recommended procedures. (L10, ST)

372-L. The Technology of Porcelain Enameling on Steel. Edward E. Marbaker. *Mechanical Engineering,* v. 73, May 1951, p. 386-392.

History; composition of enamels; preparation of enamel slips; manufacturing enamel frit; opacification; colors; enameling iron; preparation of sheet-metal surfaces for enameling; enameling process; properties of enamels; and uses of porcelain enamel. (L27, ST)

373-L. A Study of Spalling Found in Porcelain Enamel After Repeated Freezing and Thawing in the Pressure of Moisture. R. J. McEvoy and A. I. Andrews. *Journal of the American Ceramic Society,* v. 34, May 1951, p. 135-141.

Study was made in connection with defects found on porcelain-enamel liners in cold-wall domestic refrigerators. A test machine was built to duplicate the environment. It was found that enamels with a low bubble structure were superior in spall resistance. Ti enamel appeared better than other types, particularly when a clay of the kaolin type was used as suspending agent. (L27)

374-L. A Qualified Trio Answers the Three Major Objections to Enameling Aluminum. *Ceramic Industry,* v. 56, May 1951, p. 60-61.

Albert J. Schmidt, Director of Research, American Porcelain Enamel Co.; I. R. Seely, Factory Manager, Kawneer Co.; and John B. Clark, Ceramic Engineer, Foote Mineral Co. briefly discuss the above. (L26, Al)

375-L. Tumble Finishing Technique. Hubert M. Goldman. *Tool Engineer,* v. 26, May 1951, p. 37-40.

Dry and wet processes, available compounds and their properties, and operating factors. (L10)

376-L. Sealing of Anodized Aluminum Increases Corrosion Resistance. A. E. Durkin. *Iron Age,* v. 167, May 10, 1951, p. 96-98.

Sealing, which is the final step in the anodic process, is that operation which closes the pores of the anodic coating to make it nonadsorptive and stainproof. It alters the anodic coating to a monohydrate and increases its life and weathering resistance. It was found that anodized Al sealed in high-purity water with a pH controlled at or near 6 has approximately 35% more corrosion

resistance than when sealed in ordinary tap water where no pH control was exercised.
(L19, R general, Al)

377-L. The Finishing of Light Alloys. Jerome L. Bleiweis. *Metal Finishing,* v. 49, Feb. 1951, p. 49-55.

Correlated review, in outline form, of the various processes used for application of inorganic chemical or "conversion" coatings and of plated metallic coatings, to Al and Mg and their alloys. Purpose, nature of coating, treatment cycle, and comments on each specific type.
(L14, L17, Al, Mg)

378-L. Rapid Calculation of Job Plating Prices on Small Miscellaneous Shapes. *Metal Finishing,* v. 49, Feb. 1951, p. 60-62.

Tables facilitate calculation.
(L17)

379-L. Using Substitute Chemicals in Plating Baths. *Metal Finishing,* v. 49, Feb. 1951, p. 63-64, 72.

Three brief articles as follows: "Nickel Plating Without Nickel Chloride", Myron B. Diggin: "Avoiding Difficulties Caused by Shortages of Nickel Materials" (anon); and "Substituting Zinc Oxides for Zinc Cyanide in Plating Solutions", Myron B. Diggin. (L17)

380-L. Continuous Anodizing of Aluminum Coiled Sheet. Charles J. Simon. *Metal Finishing,* v. 49, May 1951, p. 63-64.

Machine whose functions are to anodize, clean, etch, seal in wax, and recoil the sheet stock, developed for Monarch Metal Weatherstrip Corp., St. Louis. (L19, Al)

381-L. Plating and Finishing Tubing at Spang-Chalfant. *Metal Finishing,* v. 49, May 1951, p. 65.

Tubing made in an electric resistance-weld tube mill and its surface finishing consisting of Zn electroplating the exterior and lacquer coating the interior.
(L17, L26, ST, Zn)

382-L. NPA Rulings Affecting the Plating Industry. *Metal Finishing,* v. 49, May 1951, p. 74-75, 111-115.

Several important changes in the regulations for plating. Includes detailed lists of articles affected. (L17)

383-L. Hot Spraying of Lacquer. James A. Bede. *Plating,* v. 38, May 1951, p. 461-463, 470.

Principles, procedures, and equipment. Emphasizes advantages. (L26)

384-L. The Electroplating Industry in Atlanta. II. Victor J. Baran. *Plating,* v. 38, May 1951, p. 464, 469-470.

Concludes review. (L17)

385-L. Making Electrotypes. Edward F. Lynch. *Plating,* v. 38, May 1951, p. 465-468.

Electrotyping is the process of producing duplicates from letterpress material by electrodepositing Cu or Ni or both on molds taken from the originals. Picture story of the individual steps taken in the production of curved electrotypes for rotary-press printing.
(L17, Cu, Ni)

386-L. Power Brushing as a Production Tool. *Magazine of Tooling and Production,* v. 17, May 1951, p. 46-47, 96.

New applications developed at Osborn Mfg. Co., Cleveland. (L10)

387-L. Bright Silver Plating in the Hollow-Ware and Spoon and Fork Trade. H. E. Hutchinson. *Journal of the Electrodepositors' Technical Society,* v. 25, 1950, p. 189-197; disc. p. 197-201. (Preprint)

Deposition of Ag from solutions containing Turkey red oil and CS_2.
(L17, Ag)

388-L. The Structure of Electrodeposited Metals. A. W. Hothersall. *Journal of the Electrodepositors' Technical Society,* v. 25, 1950, p. 203-210. (Preprint)

Lecture is intended to provide a simple qualitative picture. Relation between conditions of electrodeposition and structure and surface geometry of the base metal.
(L17, M26)

389-L. Studies in the Discontinuities of Electrodeposited Metallic Coatings. Parts II and III. S. C. Shome and U. R. Evans. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, 30 pages. (Advance Copies 1 and 1A)

Part II: two methods developed for measuring total uncovered area of a plated specimen. Results suggest that deposition starts from preexisting nuclei, and that if the initial number of nuclei can be increased, the porosity remaining after any given time of plating should be reduced. Other methods for minimizing porosity are suggested. Part III: Electrochemical bases of present methods of determining porosity of metallic coatings; a new method using H_2O_2; and experiments based on potential measurements which throw light on the relation between thickness and porosity. (L17, Ni)

390-L. Some Factors Affecting the Rate of Diffusion of Hydrogen Through Steel During Electrolytic Pickling. W. A. Bell, G. J. Metcalfe; and A. H. Sully. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, 18 pages. (Advance Copy 2)

Measurements of the diffusion of H_2 through mild steel and through steel of composition DTD4A during

cathodic treatment in various H_2SO_4 and NaOH electrolytes. Apparent H_2 diffusion varies over wide limits between various electrolytes. For mild steel, effect of cold work on diffusion rate differs between acid and alkaline electrolytes. Variations in diffusion rate are ascribed to formation of cathodic films which affect rate of transfer of hydrogen atoms into the metal lattice. The quantity of H_2 required to cause embrittlement of steel is very much less than that required to saturate the steel. 16 ref. (L13, NI, ST)

391-L. The Electrodeposition of Bright Tin-Nickel Alloy Plate. N. Parkinson. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, 23 pages. (Advance Copy 4).

Process and bath composition. Factors affecting brightness of the deposit. The alloy plate, an intermetallic compound, is fairly hard, has a pleasing rose-pink cast, and is extremely resistant to tarnishing. (L17, Sn, Ni)

392-L. Electrodeposition of Nickel in the Bores of Tubes Using Insoluble Anodes. A. W. Hothersall and G. E. Gardam. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, 15 pages. (Advance Copy 7.)

Method originated before World War II and applied in several plants during the war. Advantages and disadvantages. (L17, Ni)

393-L. Hard Chromium Plating of Large Cast Iron Drum-Drier Rolls. A. W. Wallbank and G. W. Airey. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, 6 pages. (Advance Copy 8)

Basic problem, preliminary calculations, plant design, trial runs, and operational details. (L17, CI)

394-L. The Crystal Structure of Metallic Electrodeposits. G. I. Finch and D. N. Layton. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, 12 pages. (Advance Copy 9)

Effect of bath conditions on crystal growth; electrodeposition on active substrates; and physical properties of electrodeposits, on the basis of theory and experiment. Includes photomicrographs and diffraction patterns of electrodeposited Fe, Ni, Sb, and Ag on different substrates. (L17, M26)

395-L. Electrodeposition on Aluminium—A Study of the Zincate Process. G. L. J. Bailey. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, 22 pages. (Advance Copy 10.)

Preparation of Al for plating; mechanism of adhesion and evaluation of adhesion strength; influence on adhesion of zincate composition, time, and temperature of immersion; and rate of formation and structure of Zn deposits. Results of recent published investigations. (L17, Zn, Al)

396-L. Improved Pickling—Economical Working by Means of Ion Exchange. T. R. E. Kressman. *Iron and Steel,* v. 24, May 1951, p. 181-182.

A process operating in the U. S. which avoids disadvantages of H_2SO_4 pickling; and which is cheaper in operation. (L12, Fe)

397-L. Electroplating Aluminium and Aluminium Alloy Components. Part II. Electrolytes for Various Processes. E. E. Halls. *Metal Treatment and Drop Forging,* v. 18, Apr. 1951, p. 177-182.

Various electrolytes for electro-deposition of some common and rare metals on Al and its alloys. An appendix presents notes supported by test results on durability of such coatings. (L17, Al)

398-L. Blistering Phenomena of Paints in Marine Environments. W. G. O'Driscoll. *Journal of the Iron and Steel Institute,* v. 167, Apr. 1951, p. 353-357.

Investigation of the blistering of chlorinated-rubber-base paints, applied to mild-steel panels, immersed in 0.5 N NaCl, demonstrated the presence of electrolytes within the blisters. The anodic or cathodic origin of the blisters is illustrated by potential plots over a blistered surface using a Ag-AgCl electrode. Mechanism of blistering of paints on a steel surface immersed in sea water. (L26, CN)

399-L. Acid Recovery From Continuous Strip-Pickling Lines. J. Pearson and W. Bullough. *Journal of the Iron and Steel Institute,* v. 167, Apr. 1951, p. 439-445.

When an acid-recovery system is incorporated, it is essential that the combined pickling-recovery system shall be always in balance. Concentrations of acid and ferrous sulfate, and volumes of liquor to be handled at any part of the cycle, must be known in order that the correct choice of equipment may be made. This problem is treated in a general way, so that if acid-strength requirements are specified, the other relevant information can be calculated. A numerical example is given. (L12, ST)

400-L. Plating Stainless Steel. H. H. Head. *Metal Industry,* v. 78, Apr. 13, 1951, p. 287-290.

Scale removal; polishing; racking; cleaning; activation; plating; chromium baths; and stripping. (L17, SS)

401-L. From a Metallurgist's Notebook. Faulty Chromium Deposits. H. H. Symonds. *Metal Industry,* v. 78, Apr. 13, 1951, p. 293.

Two Cr-plated jack-spindles were submitted for examination of irregularities found in the deposit. Defective areas were found on both spindles. Micro-examination revealed a cracked condition of the Cr but failed to show laminations, seams, or other defects in the base metal. (L17, Cr)

402-L. Bright Tin-Nickel Plating. N. Parkinson. *Metal Industry,* v. 78, Apr. 20, 1951, p. 305-306; disc., p. 306.

Results of experimental investigation. By appropriate choice of fluorides and their use in the correct proportions, solutions of mixed Ni and Sn chlorides can be adjusted to deposit bright alloy plate within the desired pH range. Such solutions were stable and offered a wide metal-concentration range and a favorable metal-concentration ratio. (L17, Sn, Ni)

403-L. Nickel Deposition in Tube Bores. A. W. Hothersall and G. E. Gardam. *Metal Industry,* v. 78, Apr. 20, 1951, p. 308-310; disc., p. 310-311.

Details of insoluble anode process developed. Tubes are mild steel. (L17, CN, Ni)

404-L. Corrosion-Resistant Chromium Deposits. H. Silman. *Metal Industry,* v. 78, Apr. 27, 1951, p. 327-330.

Various factors involved in production of the above on steels. 16 ref. (L17, R general, ST, Cr)

405-L. Surface Protection of Light Metals by Means of Film-Forming Organic Substances. (In German.) G. Hoffmann. *Metalloberfläche,* v. 5, sec. A, Apr. 1951, p. 61-62.

Includes tabulated comparison of corrosion resistance of uncoated metal and metal coated with 11 different organic substances. (L26, Al)

406-L. Cathode Polarization Potential During Electrodeposition of Copper. I. Nonreproducibility in Acid Copper Sulfate Solutions. L. L. Shreir and J. W. Smith. *Journal of the Electrochemical Society,* v. 98, May 1951, p. 193-202.

Constant-state polarization potential of the cathode during electrodeposition of Cu from $CuSO_4$-H_2SO_4 solutions depends upon conditions of preparation and storage of the solution and time which it is kept after preparation. Freshly prepared solutions usually give fine deposits, associated with high C.S.P. values, but on storage C.S.P. value decreases and crystal structure coarsens. Evidence was obtained that this effect is due to the presence or formation of impurities. Describes method for preparation of solutions which remain stable for several months. 24 ref. (L17, Cu)

407-L. Electrodeposition of Metals From Fused Quaternary Ammonium Salts. Frank H. Hurley and Thomas P. Wier, Jr. *Journal of the Electrochemical Society,* v. 98, May 1951, p. 203-206.

Electrolytic studies on fused mixtures of ethyl pyridinium bromide and metallic chlorides showed that the following metals can be deposited on the cathode: Ag, Cu, Bi, Pb, Sn, Ni, Co, Cd, Fe, Zn, and Al. In studies of the properties of $AlCl_3$ dissolved in fused ethyl pyridinium bromide it was found that a compound having the composition $EtPyBr \cdot AlCl_3$ is formed, and that a very low-melting eutectic occurs at 67 mole % AlCl. Al could be deposited from mixtures of 54-70 mole % $AlCl_3$. Smooth plating of Al on Fe, steel, Cu, bronze, brass, Pt, Pb, and Sn was accomplished using an Al anode. (L17)

408-L. The Electrodeposition of Aluminum From Nonaqueous Solutions at Room Temperature. Frank H. Hurley and Thomas P. Wier, Jr. *Journal of the Electrochemical Society,* v. 98, May 1951, p. 207-212.

Electrodeposition of Al in the form of white or shiny adherent plates on various metals was accomplished at room temperature. Satisfactory plating solution was developed. Use of an alternating current superimposed on the direct plating current greatly improved adherence; increased thickness without brittleness; increased maximum current density; somewhat lowered the voltage requirements; gave the same efficiency based on the direct current; and changed the appearance from shiny to satiny. (L17, Al)

409-L. Vinyl Dispersion Resin Metal Coatings. C. W. Patton. *Official Digest,* Apr. 1951, p. 224-232.

Process of preparing and baking organosols. Electron photomicrographs show difference in particle size of resins for organosol and plastisol use, and film surfaces before and after fluxing. Curves of tensile strengths of dispersion resin films after various baking times and temperatures. (L26)

410-L. Next Electroplating Techniques. 1. Alloy Deposition. 2. Use of Rare Metals. *Product Engineering,* v. 22, May 1951, p. 128-129. (L17, EG-b)

411-L. New Ceramics Aid Advances in High Temperature, Electronic Fields. *Product Engineering,* v. 22, May 1951, p. 162-163.

New developments in high-temper-

ature coatings for metals, also new ceramic dielectrics. (L27)

412-L. Wider Application Horizons for Organic Finishes. *Product Engineering,* v. 22, May 1951, p. 164-166.

New developments, with special attention to use as coatings for metals. (L26)

413-L. Barrel Deburring and Plating of Steel Stampings. Ezra A. Blount. *Products Finishing,* v. 15, May 1951, p. 28-30, 32.

How steel stampings are deburred in a two-compartment tumbling barrel with the aid of abrasives. Stampings are then plated with bright Ni in a plating barrel. (L10, L17, ST, Ni)

414-L. Die Castings Polished for Plating by Fadgenizing and Gyro-Finishing at Ternstedt. Ezra A. Blount. *Product Finishing,* v. 15, May 1951, p. 48-49.

Use of Zn-base die castings preparatory to plating, including hand and automatic polishing, buffing, and two different barrel-finishing procedures. (L10, Zn)

415-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 15, May 1951, p. 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70.

Papers on the following subjects are summarized: Mechanism of nickel electropolishing; nondestructive thickness testing in England; evaluating aircraft primer coatings; soft grits have special properties for blast cleaning of metals; and polishing and buffing zinc-base die castings prior to plating. (L general, S14, Ni, Zn)

416-L. The Production, Properties, and Uses of Thin Films Condensed in Vacuo. L. Holland. *Vacuum,* v. 1, Jan. 1951, p. 23-36.

Three major aspects of vacuum equipment: evaporation pressure, pumping speed and ultimate oil-vapor pressures, and use of discharge techniques for cleaning of contaminated supports. Applications and results of research work on structure and physical characteristics of films. 56 ref. (L25)

417-L. Automatic Polishing Machines. *Electroplating and Metal Finishing,* v. 4, May 1951, p. 149-151.

Advanced American designs used on small articles such as costume jewelry and cigarette lighters and particularly on cutlery. (L10)

418-L. Metal Spraying in France; A Survey of Recent Developments. J. Cauchetier. *Electroplating and Metal Finishing,* v. 4, May 1951, p. 163-164. (L23)

419-L. From a Metallurgist's Notebook: Blemished Tableware. H. H. Symonds. *Metal Industry,* v. 78, May 4, 1951, p. 367-368.

Silver-plated nickel-silver fish knives were found to exhibit surface pits persisting through the deposit. These were considered to have their origin in defects in the base metal. Includes photomicrographs. (L17, S15, Cu, Ag)

420-L. Rotary Pickling Plant for Handling Hot-Rolled Strip in Coils. E. W. Mulcahy. *Sheet Metal Industries,* v. 28, May 1951, p. 435-438.

The plant described performs the unique operation of opening and closing hot rolled coiled strip of all sizes up to 12 to 14 in. wide during the process of pickling, without manual preparation. (L12)

421-L. Oxyacetylene Flame Cleaning. (In French.) Cl. Mathelin. *Soudure et Techniques Connexes,* v. 4, Nov.-Dec. 1950, p. 249-257.

Procedure for removal of rust or old paint from steel plate prior to repainting. (L10, ST)

422-L. (Book) **Chrome Dur.** (Hard Chromium). 1950-51 Ed. 64 pages. Centre d'Information du Chrome Dur, Grand Palais, Porte C, Paris 8, France.

Short abstracts of papers read before the last Annual Conference, May 12th, 1950. These include: "Applications of Electropolishing and X-Ray Studies to Hard Chromium in Relation to the Influence of the Surface Condition of the Base Steel," P. A. Jacquet and A. R. Weill; "Measurement of the Microhardness of Hard Chromium Deposits," M. Le Rolland; "Summary of the Principal Uses of Chromium Plating in the Manufacture of Engineering Tools—An Outline of the Economics of Chromium Plating in Engineering Tool Manufacture," M. Martin; "Recent Advances in Chromium Plating; Results of Some Investigations," M. Meynier; "Analysis of Electrolytes by Photocolorimetry," M. Chambaud; and "Contemporary Research in France and Abroad Into Hard Chromium Plating," M. Morisset. Other papers are: "Spectrophotometric Analysis of Chromium Plating Baths," M. Jean; "Performance of Chromium Deposits in Percussion Tools," M. Armagnat; and "A Contribution to the Study of the Hardness of Hard Chromium Deposits; Experiments Carried Out in Industrial and Laboratory Vats," M. Mittene. Bibliography of 162 ref. (L17, Cr)

423-L. (Book) **Metallic and Non-Metallic Coatings for Gray Iron.** Charles O. Burgess. 1951, 76 pages. Gray Iron Founders' Society, 210 National City-E. 6th Bldg., Cleveland 14. $1.75.

Metallic coatings—sprayed metal, hot dipped, hard facing, diffusion, and electrodeposited coatings; nonmetallic coatings—organic fiinshes, vitreous or porcelain enamels; chemical conversion coatings. Also coloring and cement linings and armor. Reprint from forthcoming "Gray Iron Handbook". (L general, CI)

424-L. Vinyl-Dispersion-Resin Metal Coatings. C. W. Patton. *American Paint Journal,* v. 35, May 28, 1951, p. 60, 62, 64, 66, 68, 70, 72-73, 76.

Previously abstracted from *Official Digest.* See item 409-L, 1951. (L26)

425-L. Effect of Ferrous and Sodium Sulphate on the Rate of Nickel Deposition. J. M. Zander and O. C. Linhart. *Better Enameling,* v. 22, May 1951, p. 6-7.

Investigation as applied to deposition of a Ni flash on steel surfaces prior to vitreous enameling. (L27, Ni)

426-L. Ceramics for the Hot Spots; The Role of Heat Resistant Coatings in the Aircraft Industry. *Better Enameling,* v. 22, May 1951, p. 8-11.

Practice at Ryan Aeronautical Co. In order to withstand temperatures above 1900° C., ceramic coatings are applied to heat resistant alloy steels. (L27, AY, SG-h)

427-L. HAE—A New Coating to Protect Magnesium Against Corrosion, Abrasion, Heat. *Modern Metals,* v. 7, May 1951, p. 36, 38.

New electrochemical surface coating developed by H. A. Evangelides, an electrochemist at Frankford Arsenal. (L17, Mg)

428-L. Abrasive Cleaning of Surfaces Prior to Finishing. *Organic Finishing,* v. 12, May 1951, p. 22-24.

Miscellaneous equipment and procedures. (L10)

429-L. Protective Coatings Research by the U. S. Army Ordnance Corps. *Paint and Varnish Production,* v. 41, May 1951, p. 12-14, 27.

(L general)

430-L. How Dodge Hardfaces Gear Forging Dies. John C. McComb. *Steel Processing,* v. 37, May 1951, p. 231, 257.

Method of increasing the life of press-forging dies through hardfacing critical points of the die surface. (L24, F22, SG-m)

431-L. Rust Proof Steel Drums With Full Color Designs Turned Out by New Coating and Forming Method. E. C. Bergen. *Western Metals,* v. 9, May 1951, p. 41-43.

Equipment and procedures of Rheem Mfg. Co., Richmond, Calif. Includes forming, finishing, and resistance welding operations. (L14, G general, K3, CN)

432-L. Industrial Nickel Plating in the United States. W. H. Prine. *Metal Industry,* v. 78, May 11, 1951, p. 383-388.

An illustrated review. (L17, Ni)

433-L. Investigation of Present-Day Enameling Sheets With Respect to Their Chromium Content. (In German.) A. Dietzel and F. Schneider. *Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleute e.V.,* v. 28, Feb. 1951, p. 81-82.

Cr is detrimental to the adherence of enamel. A maximum of 0.3% Cr in sheet steel is said to be particularly undesirable. (L27, ST)

434-L. Defects in Enameled Sheet Metal Encountered in Practice. (In German.) A. Thürmer. *Sprechsaal für Keramik; Glas; Email,* v. 84, Apr. 20, 1951, p. 145-147.

Defects resulting from faulty pretreatment of the base material, defects in sheet metal or enamel, and defects resulting from inexpert or careless workmanship. Two photomicrographs show defects of porosity and cavities resulting from entrapment of gases. (L27)

435-L. Ceramic Decoration With Precious Metals. (In German.) *Sprechsaal für Keramik; Glas; Email,* v. 84, Apr. 5, 1951, p. 127-132; Apr. 20, 1951, p. 150-153.

Procedures and specifications for decorating porcelain, glass, and ceramics ware with different types of metal powder suspensions. Emphasis is on Au, Ag, and Pt. (L23, Au, Ag, Pt)

436-L. The Structure of Electrodeposited Metals and Alloys. (In German.) Ernst Raub. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Mar. 1951, p. 146-151.

Using Ag as an example, effect of polarization on properties and structure of electro deposited metals was investigated. Shows that impurities adsorbed by the cathode and incorporated into the electrolytic metal cause very strong lattice distortions and extraordinary changes in properties of the metals. The formation of alloys may also result in the formation of unstable crystals or highly supersaturated solid solutions. Several other metals and alloys were also studied. 23 ref. (L17, M26)

437-L. Anodic Polishing and Its Relation to Anodic Passivation. (In German.) Kurt Huber. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Mar. 1951, p. 165-169.

Reviews literature on theory and mechanism. 49 ref. (L19, R10)

438-L. A Surface Reaction Between Aluminum Monofluoride and Iron at Elevated Temperatures. (In German.) Armin Schneider and Werner Schmidt. *Zeitschrift für Metallkunde,* v. 42, Mar. 1951, p. 73-75.

Shows the possibility of forming, from AlF, a dense, highly adherent diffused layer of Al on heated iron, consisting mostly of chemically resistant AlF_3 which is several times as hard as Fe. High-temperature atmospheric corrosion tests with AlF_3-coated Fe gave excellent results. (L16, R3, Al)

439-L. Report of Committee B-8 on Electrodeposited Metallic Coatings. C. H. Sample, chairman. *American Society for Testing Materials,* Preprint 13, 1951, 27 pages.

Includes recommendations affecting standards and proposed tentative recommended practices for preparation of Zn-base die castings for plating, for preparation of and plating of Al alloys, and for preparation of and plating on stainless steels. (L17, Zn, Al, SS)

440-L. Ceramics in Aircraft Production. *Ceramic Age,* v. 57, May 1951, p. 33-34.

Coating airplane exhaust systems with thick porcelain enamel. Methods of coating and performance characteristics. (L27, CN)

441-L. Porcelain Enamel Solves Aircraft Engine Problem. *Ceramic Industry,* v. 56, June 1951, p. 72-73, 128.

Use of ceramic coatings at Ryan Aeronautical Co. to give improved resistance to heat and corrosive effects of exhaust gases in the exhaust systems of new aircraft piston engines. (L27,SG-h)

442-L. The Facts of Low Pressure Spraying. Roy D. Beck. *Ceramic Industry,* v. 56, June 1951, p. 74-75, 123.

Experiments show the best results can be obtained with porcelain enamel of high specific gravity and low "set." (L27)

443-L. Wet Blasting Prepares Aluminum Surface for Chrome Plate. *Die Castings,* v. 9, June 1951, p. 37-38, 52.

Process which is readily adaptable to the production plating of large quantities of parts or custom plating of individual pieces. The Cr plate is applied directly over the Al surface without chemical or electrolytic preliminary treatment; dimensional tolerances can be closely held and the build-up of edges controlled; and highspeed deposition permits plating rates considerable in excess of those obtained by conventional plating baths. (L17, Al, Cr)

444-L. Bright Nickel Plating on Metallic Single Crystals in the Absence of Addition Agent. Henry Leidheiser, Jr., and Allan T. Gwathmey. *Journal of the Electrochemical Society,* v. 98, June 1951, p. 225-230.

Ni was electrodeposited on electrolytically polished single crystal spheres of Cu and Ni under a wide variety of experimental conditions. X-ray analysis at grazing incidence indicated that the deposit on the (100) face remained monocrystalline, whereas the deposit on the (111) face was polycrystalline from the very start of deposition. The following comparative characteristics of the two types of deposits were determined: composition by spectrographic analysis, current density and current efficiency during deposition, hardness, ductility, porosity, and corrosion resistance. The results may have application in the growth of Ni single crystals by electrodeposition. (L17, M26, Ni, Cu)

445-L. New Plating Process Gives Bright Finish. *Finish,* v. 8, June 1951, p. 25.

Periodic-reverse-current plating of Ni, its advantages, and applications. (L17, Ni)

446-L. Dual Finishing for Metal Tubing. *Finish,* v. 8, June 1951, p. 27.

Manufacture of steel conduit, its exterior plating with Zn, and its interior coating with lacquer. (L17, L26, Zn, ST)

447-L. An Alignment Chart for Computing the Thicknesses of Evaporated Films. A. L. Choen and R. H. Davis. *Journal of the Optical Society of America,* v. 41, May 1951, p. 362-363.

Chart relates thickness, density, distance from source to sample of evaporated materials, angles between the surface and radius vector from the source, and mass of material evaporated. (L25, S14)

448-L. Metal Finishing of Household Equipment at Servel's Plant. Adolph Bregman. *Metal Progress,* v. 59, May 1951, p. 646-649.

Metal finishes employed by Servel fall into two classes, the entirely functional and those that are both functional and decorative. In the first group there are the Cu, Zn, and Sn electroplates, galvanizing, Zn metallizing, and aluminizing; the second group embraces the nonmetallic coatings such as baked enamels, black and aluminized black Japans, porcelain enamel, and "plastic coatings." In addition, a number of surface treatments are employed either as a preparatory step for subsequent surface coating or as a corrosion preventive process. Processes and equipment. (L general, T10)

449-L. Origin and Use of Clad Steel Plate. William G. Theisinger. *Metal*

Progress, v. 59, May 1951, p. 671-672, 708, 710, 712, 714, 716.

History and present manufacturing practices for Ni-clad carbon steel. Applications. (L22, T general, Ni, CN)

450-L. Increased Belt Life and Cut With New Contact Wheel. W. K. Van Ormer. *Plating*, v. 38, June 1951, p. 554-555, 557.

New type of rubber contact wheel for abrasive-belt polishing with backstand idler which permits double the output from a standard abrasive belt in those operations where glazing normally occurs. (L10)

451-L. Determination of Plate Thickness on Zinc Base Alloy Diecastings. Harold E. Brown. *Plating*, v. 38, June 1951, p. 556-557.

Rapid method for approximate determination of average thickness on significant surfaces of Zn die castings. Thicknesses of Cr, Ni, and Cu electrodeposits are determined by solution, followed by gravimetric or volumetric procedures. (L17, S11, Cr, Ni, Cu, Zn)

452-L. Choose the Right Nickel Plating System. *Steel*, v. 128, June 4, 1951, p. 94-96, 117-118, 121, 124, 127, 130, 132.

Various bath compositions and plating conditions, their relative advantages and disadvantages for different jobs. (L17, Ni)

453-L. A Tag Tinning Machine. C. Pearce. *Machinery* (London), v. 78, May 17, 1951, p. 823-824.

In telecommunication equipment and light electrical apparatus generally, extensive use is made of soldered connections between wires and tags. Electrotinning is not so satisfactory as a base for soldering connections as hot dipping in a solder bath, and many pieces are dipped by hand. Equipment was designed to tin a wide range of flat and approximately flat parts. (L16, T1, Sn)

454-L. Plating Aluminium With Nickel. J. M. Bryan. *Metal Industry*, v. 78, May 18, 1951, p. 405.

Modified process which proved suitable for commercial application. Solution compositions, plating times, and current densities. (L17, Al, Ni)

455-L. From a Metallurgist's Notebook. Sherardised Castings. H. H. Symonds. *Metal Industry*, v. 78, May 18, 1951, p. 407-408.

Investigation showed that the Sherardising operation could not have produced the structural differences noted. This refuted the allegation that Sherardising of malleable iron castings had caused extreme brittleness. (L15, M27, Zn, CI)

456-L. Tin Plating. Frederick A. Lowenheim. *Metal Industry*, v. 78, May 25, 1951, p. 423-425.

Describes American practice in electro-tinning of cold-rolled strip steel for tinplate. Also discusses general jobbing and manufacturing operations. (L17, Sn, ST)

457-L. The Chromising Process; Treatment of Steel by Gaseous Chromous Chloride. T. Gibson. *Metal Treatment and Drop Forging*, v. 18, May 1951, p. 201-204.

Process now being practiced on a commercial scale by a British firm, and its applications. (L15, ST, Cr)

458-L. On the Theory of Electrolytic Polishing. (In English.) E. Bösiger. *Experientia*, v. 7, May 15, 1951, p. 175-179.

A theory according to which the polishing action results from concentration of anions at points of irregularity of the metal surface. This enrichment is caused by the fact that these high spots have an especially high field strength, resulting in preferential attraction of anions. (L13)

459-L. Formation of Spots on Precious Metal Deposits. (In German.) Walter Burkart. *Metalloberfläche*, Ser. B, v. 3, May 1951, p. 65-66.

Spotting is primarily caused by porosity either in the base metal or in the electrodeposit. Two recommended means for prevention are polishing of the base metal and increasing thickness of the electrodeposit. (L17, EG-c)

460-L. Experiences With Painting Iron, Zinc, and Light Metals. (In German.) G. Hoffmann. *Metalloberfläche*, ser. B, v. 3, May 1951, p. 69-71.

Preparation of the metal surfaces, application and drying of different types of base coats and protective paints, and determination of the weathering resistance of paints, varnishes, or lacquers. Because of the danger of galvanic action, the importance of insulating different metals against each other is indicated. (L26, Fe, Zn, Al, Mg)

461-L. Physical Principles of the Deposition of Metallic Coatings With the Gas-Heated Wire Spray Gun. (In German.) K. Krekeler and H. Rabenschlag. *Metalloberfläche*, ser. A, v. 5, May 1951, p. 71-74.

Several more or less contradictory theories. A method for computing the velocity required to melt the particles upon impact upon the base metal and of determining the actual impact velocity. Results of an experiment made to determine temperature of the deposited particles show that they are actually deposited in a

plastic or molten state and that the base is heated by the force of impact. 10 ref. (L23)

462-L. The Hardness of Hard-Chromium Layers. (In German.) Heinrich Arend. *Metalloberfläche,* Ser. B. v. 3, May 1951, p. 72-76.

Review of literature, confined to a discussion of the various factors that influence the hardness of electrodeposited Cr. Shows that electrolytic conditions determine the type of Cr formed and that the hardest type contains 0.044% H_2. 18 ref. (L17, Cr)

463-L. Defects in the Production of Cast Brass for Special Enameling. (In German.) Edmund R. Thews and Gheorghe Draghincescu. *Metalloberfläche,* ser. A, v. 5, May 1951, p. 76-79.

How base metals can affect the quality of enamels and possibly be responsible for cracking, scaling, and flaking. Specific causes and means of prevention of poor enameling on Tombac alloys (90-10 Cu-Zn) (L27, Cu)

464-L. Weld Depositibn of Wear Resistant Alloys on Hard Manganese Steel Tools. (In German.) W. Hummitzsch and A. Schmidt. *Schweissen und Schneiden,* v. 3, May 1951, p. 147-150.

The tough Cr-Mn austenite formed upon the arc-weld deposition of high-Cr alloys on hard Mn steel renders the tools or equipment parts highly resistant to impact and thus greatly increases their life span. (L24, Ts, Ay)

465-L. Anodic Oxidation of Aluminum and its Alloys. (In Italian.) *Alluminio,* v. 20, No. 1, 1951, p. 61-86.

10 references. (L19, Al)

466-L. High-Purity Aluminum-Magnesium Alloys for Anodic Polishing. (In Italian.) J. Hérenguel. *Metallurgia Italiana,* v. 43, Feb. 1951, p. 72-73.

Conditions for production of polished surfaces by anodic treatment of Al-Mg alloys. These are absence of separate phases and macroscopic segregations of Mg in the solid solutions, fine grain size, absence of preferential orientations, and choice of oxidizing conditions not favoring anisotropy in the rate of growth of the oxide film. (L19, Al, Mg)

467-L. Electroplating Stainless Steels; A Critical Review With Recommended Practices. Joseph Haas. *Metal Finishing,* v. 49, June 1951, p. 50-54.

Includes data based on experience in plating various types of stainless steels. 11 ref. (L17, SS)

468-L. Production Plating of Plastics. W. A. Raymond. *Metal Finishing,* v. 49, June 1951, p. 55-57.

Equipment, procedures, and applications. (L17)

469-L. Bright Zinc Plating. R. O. Hull and J. B. Winters. *Metal Finishing,* v. 49, June 1951, p. 58-61, 63.

Details of bath compositions, plating conditions, analytical procedures, etc. (L17, Zn, ST)

470-L. Rinsability and Buffering Action of Alkaline Cleaners. *Metal Finishing,* v. 49, June 1951, p. 62-63.

ASTM proposed methods of testing for rinsing of cleaners and test for buffering action. (L12)

471-L. Fatigue Loss and Gain By Electroplating. J. O. Almen. *Product Engineering,* v. 22, June 1951, p. 109-116.

Reasons for damage caused by electrodeposited metals when plated by methods now in common use. Suggests developments in electroplating processes, whereby electrodeposited coatings may possibly be made as effective as shot peening in increasing fatigue strength of plated machine parts. Platings of Ni and Cr on steel. 14 ref. (L17, Q7, ST, Ni, Cr)

472-L. Porcelain Enamel Coatings. *Product Engineering,* v. 22, June 1951, p. 141-148.

Some new developments including color enamels, one-coat applications, and a large variety of formulations. Chart shows properties of white cover-coat porcelain enamels. (L27, ST)

473-L. Electroplating Aids in Clad Steel Production. S. E. Sangster. *Products Finishing,* v. 15, June 1951, p. 12-16.

Process at Lukens Steel Co. Carbon or low-alloy steel is clad with stainless, monel, Inconel, or Ni. The steel is Ni-plated prior to the actual cladding process. (L22, L17, CN, AY, SS, Ni)

474-L. Aircraft Finish Demonstrates Durability. Gilbert C. Close. *Products Finishing,* v. 15, June 1951, p. 36.

A wing flap which fell into the ocean 5 years ago was found to be in very good condition. Original finish on the flap, principally 24ST Alclad Al sheet, consisted of anodic treatment in a chromic acid bath, a coating of Zn chromate primer conforming to specification An-P-656, and a top coat of An-L-29 sky-blue lacquer. In no area had the finish system failed sufficiently to permit corrosion of the underlying material. (L19, L26, R4, Al)

475-L. Automatic Spray Finishing of Aluminum Siding. Richard H. Nappi. *Products Finishing,* v. 15, June 1951, p. 44-46.

Application of enamel finish by Industrial Finishing Co., Long Island City, N. Y. (L26, Al)

476-L. Wear Testing of Hard Chromium Coatings. (In French.) H. Wahl and K. Gebauer. *Métaux Corrosion-Industries,* v. 26, Jan. 1951, p. 29-46.

Methods of testing, apparatus and technique used, establishing optimum conditions of Cr plating. Factors involved, such as temperature of bath, current density, type of bath, etc. Specific fields of application of hard Cr plating. (L17, Q9, Cr)

477-L. (Book) **Industrial Polishing of Metals.** Gerald F. Weill. 194 pages. 1950. Iliffe & Sons, Ltd., Dorset House, Stamford St., London, S.E. 1, England. 21s.

Scientific and practical information on metal polishing in a handbook approach. Shop data are heavy on British practice, but of a general enough nature to be of value to American engineers. History, theory, techniques, procedures, production processes, and associated shop problems. Theory of polished surfaces. (L10)

478-L. The Nature and Use of Petroleum Base Rust Preventives. Howard B. Carpenter. *American Society of Lubrication Engineers,* 1951, 15 pages.

Properties and applications. Covers plastic types (grease-like), fluid types, thin film types, and solvent types. (L26)

479-L. A New Processing Scalebreaker. J. I. Greenberger. *Iron and Steel Engineer,* v. 28, June 1951, p. 95-101; disc., p. 101.

New type of scalebreaker used to facilitate scale remover by passage through rolls prior to pickling. Results of test runs show improvements over old methods for both plain carbon and stainless steels. Details of calculation of power requirements. Pickling time and acid requirements are reduced substantially. (L10, L12, ST)

480-L. Thin, Attractive Metal Coatings Produced by Vacuum Method. Kenneth Rose. *Materials & Methods,* v. 33, June 1951, p. 71-73.

Procedures and applications. Al is the most widely used metal for vapor metallizing nonmetallic materials such as plastics, glass, fabrics, and paper. (L25, Al)

481-L. Preparation of Very Fine Wire by Electropolishing. William H. Colner, Morris Feinleib, and Howard T. Francis. *Metal Progress,* v. 59, June 1951, p. 795-797.

Development of a process by which stainless steel wire, and wire of other metals and alloys, may be reduced in diameter far below the limit possible by conventional wire-drawing practices, by a readily controllable process of continuous electropolishing. Product's eventual fineness is determined chiefly by wire speed and polishing current, once composition, temperature, and agitation of bath are under control. (L13)

482-L. Ceramic Coatings for Molybdenum. *Metal Progress,* v. 59, June 1951, p. 872, 874. (Condensed from "A Study of Ceramic Coatings for High-Temperature Protection of Molybdenum", D. G. Moore, L. H. Bolz, and W. N. Harrison.)

Previously abstracted from *National Advisory Committee for Aeronautics,* Technical Note 1626, July 1948. See item 7c-30, 1948. (L27, Mo)

483-L. Studies of High-Temperature Protection of a Titanium-Carbide Ceramal by Chromium-Type Ceramic-Metal Coatings. Dwight G. Moore, Stanley G. Benner, and William N. Harrison. *National Advisory Committee for Aeronautics,* Technical Note 2386, June 1951, 26 pages.

A coating consisting of 80 parts Cr powder, 20 parts frit (glass), and 5 parts kaolin, when applied to a ceramal of 80% TiC and 20% Co and fired with H_2, will inhibit oxidation of the ceramal for extended periods at 1800° F. Durability of the coating as affected by frit content, firing temperature, firing time, and number of coats. Relative effectiveness of the coatings at jet-engine temperatures. Four coatings of varying frit content were applied and the specimens were studied with respect to oxidation penetration, transverse breaking load, and thermal shock resistance after prolonged heating in air at 1650, 1800, 2000, and 2200° F. (L27, Cr, C-n)

484-L. Some Characteristics of Composite Tungsten Carbide Weld Deposits. Howard S. Avery. *Welding Journal,* v. 30, June 1951, p. 532-534.

Author of the above article, which appeared in the Feb. 1951 issue (item 118-L) replies to comments and discussion published in the same issue. (L24, Q9, C-n, W)

485-L. Ceramic Coatings Prevent Exhaust-Gas Corrosion. *Technical News Bulletin* (National Bureau of Standards), v. 35, June 1951, p. 89-91.

Development of above by Dwight G. Moore and Mary A. Mason. (L27, R9, Ni, SS, Co, SG-h)

486-L. Nodule Method Measures Adhesion of Electrodeposits. *Technical News Bulletin* (National Bureau of Standards), v. 35, June 1951, p. 80-82. (Condensed from paper by Abner Brenner and Virginia Dare Morgan.)

Previously abstracted from *Proceedings of the American Electroplaters' Society.* See item 120-L. (L17)

487-L. The Finishing of Stainless Steels. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 23, May 26, 1951, p. 85-88.

Ways in which a high degree of surface finish can be obtained. Pickling of stainless steels and differences between this operation on stainless and normal steels. Polishing and buffing operations. A table shows the recognized scale of finishes on stainless steel. Notes on the finishing of welds in stainless steel. (L general, SS)

488-L. A Review of Factors Influencing the Life of Galvanizing Pots. D. N. Fagg. *Sheet Metal Industries,* v. 28, June 1951, p. 574-575.

Temperature of Zn, composition of the steel used to make the pot, defects in the pot arising during fabrication, and composition of the Zn. (L16, R6, Zn, ST)

489-L. Electric Furnaces for Vitreous Enamelling. *Sheet Metal Industries,* v. 28, June 1951, p. 576-578.

Equipment used. (L27)

490-L. The Chromising Process. T. Gibson. *Sheet Metal Industries,* v. 28, June 1951, p. 569-571, 575.

Abstracted under similar title from *Metal Treatment and Drop Forging.* See item 457-L, 1951. (L15, ST, Cr)

491-L. Causes of the Retarding Effect of Aluminum in Galvanizing Baths. (In German.) H. Bablik, F. Götzl, and R. Kukaczka. *Werkstoffe und Korrosion,* v. 2, May 1951, p. 163-165.

The time-limited and temperature-dependent retardation of the reaction of fusible Zn with solid Fe caused by small Al additions is explained by formation of an Fe-Al film which blocks diffusion of Zn and Fe. (L16, Zn)

492-L. Prevention of Corrosion by Metal Spraying. (In German.) H. Biel. *Werkstoffe und Korrosion,* v. 2, May 1951, p. 182-185.

A coefficient derived from the heat content of each metal is used to determine rate of supply in wire-spraying apparatus and particle size of the metal in powder-spraying apparatus. Efficiency of powder-spraying apparatus is said to be higher than that of wire-spraying apparatus. The first are used for nonmetallic materials, hard metals, and partly for Zn. Corrosion tests showed a decrease of resistance in the following order: wire-sprayed, powder-sprayed, coatings prepared electrolytically or by dipping into molten Zn. (L23)

493-L. Testing of Efficacy of Various Methods of Cleaning Mineral-Oil Layers From Steel Surfaces. (In Polish.) M. Smialowski, J. Foryst, and I. Madejski. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 1, 1951, p. 55-63.

Sheet steel specimens were coated with mineral oil, by immersion in machine-oil solutions of benzene, and then subjected to the action of various emulsifying baths. Degree of oil removed was determined by observations of fluorescence effect using ultraviolet rays. It was found that oil layers deposited in above way can be more easily removed than layers left after cold rolling of sheets. The electrolytic cleaning method is superior to immersion in emulsifying baths, but application of organic solvents is most satisfactory. (L12, ST)

494-L. Surface Treatments for Cutting Tools. *American Machinist,* v. 95, July 9, 1951, p. 183.

Data sheet gives several treatments used in the automotive industry to increase the life of cutting tools. They are as follows: fine-finish grinding; nitriding, single treatment; nitriding, double-treatment; hard Cr plating; and steam oxidizing.
(L17, G18, J28, TS)

495-L. New Chemical Bath "Blasts" Scale From Forgings. *Automotive Industries,* v. 105, July 1, 1951, p. 57.

Scale-removal process using a new proprietary chemical—Pennsalt SR-4—developed by Pennsylvania Salt Mfg. Co. (L12, ST)

496-L. Fabrication and Finishing at Perfection Stove. Walter Rudolph. *Finish,* v. 8, July 1951, p. 21-24.

Equipment and procedures. Press operations and finishing.
(L general, G1, CN)

497-L. Flow Coating Cabinets and Components for Dishwashers. Arnold Carlsen. *Finish,* v. 8, July 1951, p. 27-28, 62.

How Hotpoint covers 28,000 sq. ft. of metal surface area in 16 hr. with 12 gal. of prime coat at the Milwaukee dishwasher plant. (L26, CN)

498-L. Five-Minute Bath Descales Forgings. *Iron Age,* v. 168, July 5, 1951, p. 86.

See abstract of "New Chemical Bath 'Blasts' Scale From Forgings," *Automotive Industries,* item 495-L. (L12, ST)

499-L. Armed Forces Adopt New Waterproof Packaging. *Iron Age,* v. 168, July 12, 1951, p. 96-97.

New packing material just approved by the Armed Forces and sold under the trade name "Metalam." It is composed of layers of cotton scrim, polyethelene, Al foil, and an outer vinyl film. It is being used to protect all types of war material, from finished products to replacement parts. (L26, Al)

500-L. Plating in the Re-Armament Program. Seymour Senderoff. *Metal Finishing,* v. 49, July 1951, p. 86-88, 114.

A general discussion. (L17)

501-L. Finishing Army Ordnance Materiel. G. T. Viglione. *Metal Finishing,* v. 49, July 1951, p. 89-91, 114-115.

Measures being taken to prevent corrosion difficulties encountered on ordnance material and a survey of the finishes available to ordnance engineers to alleviate operational difficulties due to corrosion.
(L general, T2)

502-L. Plating's Role in Naval Ordnance; The Naval Gun Factory at Anacostia. *Metal Finishing,* v. 49, July 1951, p. 92-95, 115-116.

Facilities of the gun factory.
(L17, T2)

503-L. Electroforming of Precision Military Components. S. G. Bart. *Metal Finishing,* v. 49, July 1951, p. 96-97, 116-117.

Process is defined as "the creation of metallic articles by electrodeposition." Mechanical aspects of the process. Typical modern applications.
(L18)

504-L. Military Applications of Electroforming. M. H. Orbaugh. *Metal Finishing,* v. 49, July 1951, p. 98-99, 118-120.

Illustrated survey includes description of the process. (L18, T2)

505-L. Hard Chrome Plating—the Industrial Workhorse. J. A. Williams. *Metal Finishing,* v. 49, July 1951, p. 100-102, 120.

Illustrated survey of above process, properties of the plate, and applications. (L17, Cr)

506-L. Heavy Silver Plating of Bearings. Frank C. Mesle. *Metal Finishing,* v. 49, July 1951, p. 103-104, 121-122.

Process by which coatings 0.020-0.060 in. thick are applied to steel for aircraft engine bearings. Comparative lives of these and other types of bearings are shown graphically.
(L17, Ag, ST, SG-c)

507-L. Phosphate Coatings in Defense Production. Alfred Douty. *Metal Finishing,* v. 49, July 1951, p. 105-108, 120-121.

Procedures and applications. The latter include: paint-bonding to Fe, Zn, Cd, Al, and their common alloys; "rustproofing" of Fe, steel, and Al, with or without the aid of corrosion-preventive oils, etc.; protecting friction surfaces of ferrous metal; and improving cold drawing, cold extrusion, and cold forming of steel.
(L14, F general, Fe, Zn, Cd, Al)

508-L. Chromate Finishes in War and Peace. H. C. Irvin. *Metal Finishing,* v. 49, July 1951, p. 109-113

Nature and properties of chromate films, their applications to various metals, their corrosion resistance and appearance, their use as paint bases, their mechanisms of action, formulation of chromate baths, and bath variations required by processing limitations. They are applied to Zn, Cd, Al, Cu, brass, and bronze.
(L14, Zn, Cd, Al, Cu)

509-L. Production Prime Coating of Automotive Parts. Fred M. Burt. *Organic Finishing,* v. 12, June 1951, p. 8-10, 15.

The prime-coating installation at the Nash automobile assembly plant, Calif. The conveyor, cleaning and phosphating, solution heating methods, dry-off oven, dip installation, and baking. (L26)

510-L. Factors Affecting the Testing of Automotive Finishes. Ralph J. Wirshing and Wardley D. McMaster. *Paint, Oil, & Chemical Review,* v. 114, July 5, 1951, p. 12-14, 16-18.

Typical experimental results on alkaline cleaning methods, enameled Cr surfaces, and primers and surfacers. Data are charted and tabulated; exposure-test panels are illustrated.
(L12, L14, L26, CN, Cr)

511-L. Cleaning and Preparation of Metals for Electroplating. III. Degreasing Evaluation Tests: The Atomizer Test. Henry B. Linford and Edw. B. Saubestre. *Plating,* v. 38, July 1951, p. 713-717.

New method for determining the presence of greasy materials on metal surfaces. The test involves the following steps: evaporation of all surface moisture; spraying of water against the panel using an atomizer; and measuring of areas covered by a thin, uniform film of water. Details of the equipment and procedure. Results obtained with oiled panels cleaned to various degrees in alkaline solutions. (L12)

512-L. Metal Surfacing for Original Parts. *Product Engineering,* v. 22, July 1951, p. 122-124.

Various processes and metals and alloys used for the above. The main processes are welding, metallizing, and vacuum deposition. Mechanical properties of various surfacing materials are shown graphically.
(L22, L23, L24, L25, Q general, SG-m)

513-L. Refractory Facing on Mild Steel. *Engineering,* v. 171, June 22, 1951, p. 763. (From Report 50/4/73, Industrial Gas Development Committees, Gas Council, London.)

Process for protection of mild steel against the effects of high temperature, in which the steel is given a refractory coating. The process con-

sists in carrying, in a borosilicate matrix, a suspension of insoluble refractory material and bonding it to the metal surface by fusion at about 800° C. Properties of the coating depend on proportion of refractory matrix, particle size, number of layers present, and porosity of the upper face. (L27, CN)

514-L. The Problem of Painting Bright Chromium Plate. Wardley D. McMaster. *Plating,* v. 38, July 1951, p. 696-698, 703.

Difficulty was experienced in obtaining satisfactory adhesion of enamel to Cr plate in the automotive industry. Effects of various factors were studied experimentally, including pretreatments, base metal (no effect), acid concentration used for pretreatment, drying technique, and enamel formulation. (L26, Cr)

515-L. From Laboratory to Production Line. *Die Castings,* v. 9, July 1951, p. 42-43, 58-59.

Chemical cleaning and electrostatic spray finishing of pressed-steel and die-cast Al and Zn parts for business machines.
(L12, L26, ST, Al, Zn)

516-L. Organic Coatings for Substitute Finishes and Protective Films. *Die Castings,* v. 9, July 1951, p. 44, 61.

Possibilities of substitutions forced by government restrictions on plating metals. (L26)

517-L. Automatic Barrel Plating; New Canning Plant at the British Screw Co., Ltd. *Iron and Steel,* v. 24, June 1951, p. 217-220.

Includes layout diagram and illustrations of Zn plating for screws, bolts, and nuts. (L17)

518-L. Continuous Electrogalvanizing. *Metal Industry,* v. 78, June 15, 1951, p. 484-489.

Said to be the largest continuous electrogalvanizing plant in the world. It is operated by Maclean & Co., Ltd., in England. (L16, Zn, CN)

519-L. Procedure for Repairing Articles of Steel, Cast Iron, Copper and Its Alloys, Aluminum, and Light Alloys by Powdered-Metal Spraying Using an Oxy-Acetylene Torch. (In French.) M. Cauchetier. *Fonderie,* Mar. 1951, p. 2385-2391.

A method for making the above repairs by passing the metal through the torch and, with the aid of compressed gas, forcibly bringing the metal into contact with the article to be repaired at the precise moment when it melts. (L23)

520-L. Study of Electrolytic Deposits in Very Dilute Solution. I and II. (In French.) André Coche. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 48, Mar.-Apr. 1951, p. 135-149.

Part I: Use of radioactive isotopes as indicators. Influence of electrode and concentration on the critical potential. Shows that the latter is directly dependent on the nature and surface of the electrode; and that, even for Au, dilute solutions show anomalies, and that Pb-Pt systems differ greatly in behavior from others. Critical potentials and deposits of Po on Mo, W, and Ta; of Bi on Au, Pt, and Ta; of Pb on various metals; of Bi on Au; and of Pb on Pt were studied. Part II describes and diagrams a potentiostat for study of potentials. (L17)

521-L. Prevention of Slagging and Corrosion by Means of Protective Coatings on the Fire Side of Boiler Heating Surfaces. (In German.) H. Böhme. *Brennstoffe-Wärme-Kraft,* v. 3, June 1951, p. 189-192.

Effects of treatment of the boiler-tube surfaces with lime and with graphite, and of coating them with different metals. Photographs and tabular data show that only the graphite-oil treatment gives satisfactory results. (L26, ST)

522-L. Cathodic Polarization During Electrodeposition of Nickel. (In Russian.) A. T. Vagramyan and E. A. Solov'eva. *Doklady Akademii SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 1, 1951, p. 629-631.

Relation between overvoltage and current density within wide limits of the latter. A new method for rapid determination of the shape of the polarization curve is proposed. Theoretical basis of this method, its technique, and optimum conditions of operation. (L17, Ni)

523-L. A Discussion of Structural Steel Painting. D. S. Threlkeld. *American Paint Journal,* v. 35, July 16, 1951, p. 68, 70-72.

Proposes the maintenance of adequate data records to follow field application and performance.
(L26, CN)

524-L. The Cobalt-Reduction Theory for the Adherence of Sheet-Iron Ground Coats. J. H. Healy and A. I. Andrews. *Journal of the American Ceramic Society,* v. 34, July 1, 1951, p. 207-214; disc., p. 219-220.

New data on the adherence phenomenon of Co ground-coat enamels. The H_2-reduction theory. Shows that Co oxide of the enamel is reduced to Co metal which forms a bond with the Fe and the enamel. 57 ref. (L27, CN)

525-L. The Elements of the Third, Fourth, and Fifth Series as Possible

Adherence-Promoting Materials for Sheet-Iron Enamels. J. H. Healy and A. I. Andrews. *Journal of the American Ceramic Society*, v. 34, July 1, 1951, p. 214-219; disc., p. 219-220.

These elements were divided into five groups on the basis of such properties as heats of formation, melting points, vapor pressures, atomic radii, unit-cell dimensions, and H_2 solubilities. 13 ref. (L27, P12, P10)

526-L. Electroforming Speeds the Production of Aircraft Parts and Tools. G. B. Lewis and L. Frost. *Machinery* (American), v. 57, July 1951, p. 178-185.

Kinds of metals deposited, types of molds and matrices used, and general procedure followed in making airplane parts and molds by electroforming. (L18)

527-L. The Evaluation of Vinyl Coatings for Surfaces Subject to Fresh Water Immersion. J. L. Rohwedder and F. W. Shanks. *Paint and Varnish Production*, v. 41, July 1951, p. 19-22, 34.

Method used by Rock Island District, Corps of Engineers, for evaluation of coatings for structural steel components. (L26, CN)

528-L. Metallizing—To Prolong Life of Refinery Equipment. Joe E. Young, Jr. *Petroleum Refiner*, v. 30, July 1951, p. 118-120.

The process and its refinery applications. (L23, T29)

529-L. Blitz Cans Receive Corrosion Resisting Specification Finish in Production Finishing Setup. Ezra A. Blount. *Products Finishing*, v. 15, July 1951, p. 38-48, 50, 52.

Equipment and procedures for production of 5-gal. flat gasoline containers for the Armed Forces, by Conco Engineering Works, Mendota, Ill. Includes shearing, stamping, forming, parts cleaning and assembly, phosphating, electrostatic spray painting, and infrared baking. (L general, G general, CN)

530-L. Solution Heating Methods Improve Plating Plant Operating Efficiency. Arthur Q. Smith. *Products Finishing*, v. 15, July 1951, p. 58-62.

Equipment and procedures of Electro-Platers Co., Milwaukee, a job-plating shop. (L17)

531-L. Outlook for Continuous Galvanizing Lines in U. S. A. E. A. Matteson. *Products Finishing*, v. 15, July 1951, p. 64.

Excerpts from an address. (L16, CN, Zn)

532-L. Symposium on Design: Components for Vitreous Enamelling. *Sheet Metal Industries*, v. 28, July 1951, p. 661-669.

Lengthy summaries of the following papers presented at recent British meeting: "The Styling of Enameled Products." A. B. Kribride: "The Production of Castings for Subsequent Vitreous Enamelling," Wm. Todd; "Design and Production of Sheet-Metal," C. S. Beers: and "An Enameller's Viewpoint of Design," T. J. MacArthur. (L27)

533-L. Suspending Devices for Plating Baths. (In German.) O. Kramer. *Metalloberfläche*, ser. B, v. 3, June 1951, p. B81-B83.

Various types of these devices. (L17)

534-L. Anodes for Chromium Plating. (In German.) Edm. R. Thews. *Metalloberfläche*, ser. B, v. 3, June 1951, p. B84-B86.

Various published and patented suggestions on improvement of anodes and, especially, on the use of soluble anodes. (L17, Cr)

535-L. Investigation of Deposition Welding of Rails. (In German.) K. Wellinger and H. Gaisser. *Schweissen und Schneiden*, v. 3, June 1951, p. 173-178.

Results of hardness tests, wear-resistance tests, and microstructures of deposits of seven different coated and uncoated electrodes on street-car rails. (L24, T23, CN)

536-L. Influnce of Additions on Electrodeposition of Metals. (In Russian.) V. V. Mikhailov. *Uspekhi Khimii* (Progress in Chemistry), v. 20, Mar.-Apr. 1951, p. 194-212.

The action of foreign cations, anions, and non-electrolytes are investigated; and existing theories of effect of additions critically discussed. 76 ref. (L17)

537-L. Vitreous Enamel for Aluminum. William F. Carroll. *American Ceramic Society Bulletin*, v. 30, July 1951, p. 232-233.

A low-melting enamel for use on aluminum was developed, based on a phosphate glass. The enamel was attacked by strong acids and alkalis but was unaffected by extended exposure to boiling water. Some protective layer was found to be necessary to prevent reaction between the aluminum and the enamel; copper was found most successful for this purpose. Good white was obtained, using TiO_2 as opacifier. Satisfactory colors can be obtained. (L27, Al)

538-L. Ceramic Coatings Prevent Exhaust-Gas Corrosion. *Better Enameling*, v. 22, July 1951, p. 6-7, 30.

Five heat resisting alloys were investigated: Inconel, Types 347 and 19-9DL stainless steels, Vitallium, and S-816. Specimens of each alloy

with five different coating conditions were studied: an uncoated specimen, a preoxidized specimen, and three ceramic-coated specimens. (L27, Ni, SG-h)

539-L. Bending Steel Plate in 180° Arc Doesn't Loosen Its Plastic Corrosion-Resistant Coating. *Chemical Processing,* v. 14, July 1951, p. 18.

Sample metal plate covered with U. S. Royalguard air-drying plastic coating is bent through a 180° arc to demonstrate its flexibility and adhesion. The coating neither chips nor cracks, and can be used on steel, aluminum, concrete, hard wood, or composition board. (L26, CN, Al)

540-L. Progress in Metal Spraying Equipment. H. J. Plaster. *Electroplating and Metal Finishing,* v. 4, July 1951, p. 215-217.

Reviews developments. (L23)

541-L. Material Economy. Frank Wild. *Electroplating and Metal Finishing,* v. 4, July 1951, p. 218-220.

Conservation of cleaners and swills, anodes, acids, etc., used in electrochemical processes. (L17, A8)

542-L. Design for Vitreous Enamelling. I. Styling of Enamelled Products. A. B. Kirkbride. **II. Production of Castings for Subsequent Vitreous Enamelling.** Wm. Todd. **III. Design and Production of Sheet-Metal Parts.** C. S. Beers. **IV. Enameller's Viewpoint of Design.** T. J. MacArthur. *Foundry Trade Journal,* v. 91, July 5, 1951, p. 17-24, 26.

(L27)

543-L. Heat Resistant Aircraft Alloys Protected From Corrosion by Ceramic Coatings. *Industrial Heating,* v. 18, July 1951, p. 1269-1270, 1272.

Abstracts of two papers presented at the American Ceramic Society meeting: "Ceramic Coatings for the Prevention of Carbon Absorption in Four Heat Resistant Alloys," by Joseph W. Pitts and Dwight G. Moore; and "Effectiveness of Ceramic Coatings in Reducing the Corrosion of Five Heat Resistant Alloys by Lead Bromide Vapors," by Dwight G. Moore and Mary A. Mason. (L27, R general, AY)

544-L. Low-Cost Equipment Improves Electroplating. G. W. Jernstedt. *Iron Age,* v. 168, July 26, 1951, p. 73-75.

How techniques such as spray rinse, fog nozzles, diaphragms, air agitation, filtration, heat exchangers, and PR plating processes can be used to best advantage efficiently and economically. Opportunities for improvement of general electroplating practice are tabulated. (L17)

545-L. Hardfacing—Applications to the Iron and Steel Industries. P. L. Pocock. *Iron and Steel,* v. 24, July 1951, p. 323-326.

Materials and processes. "Stellite" is the principal material used for hard facing. The value of hard facing in its various applications. (L24, Co, SG-m)

546-L. High Temperatures; A Refractory Facing for Protecting Mild Steel. *Iron and Steel,* v. 24, July 1951, p. 336.

Describes a material called "Stoneclad," consisting of a borosilicate matrix containing insoluble refractories. This can be bonded to a metal surface to protect it during long periods of use at high temperatures. (L27, CN)

547-L. Finishing Supplement: Plating Hints. Thomas M. Rodgers. *Metal Industry,* v. 79, July 6, 1951, p. 6-7.

Various processes of cleaning metal before plating. (L17, L12)

548-L. Leveling Solutions. Adolph Bregman. *Metal Progress,* v. 60, July 1951, p. 56-60.

Brief summary of recommended methods in the use of leveling solutions. Factors affecting leveling with periodic reverse plating include PR cycle, current density, thickness of deposit, agitation, solution composition, addition agents and solution contamination. (L17)

549-L. Coating Problems in Metal Lithography. Part I. Charles R. Bragdon. *Modern Lithography,* v. 19, June 1951, p. 77, 79, 81; July 1951, p. 61, 63, 65.

The problem of decorating metal for cans and screw caps. The decorative film must withstand stretching and other distortions caused by the stamping process. Problems in thickness, composition, toxicity, color, taste, and flexibility of the coating. (L26)

550-L. Chromium Plating on Aluminium. *Machinery* (London), v. 79, July 5, 1951, p. 37.

New method whereby Cr can be plated directly onto the surface of Al. (L17, Al, Cr)

551-L. Tallow Can Replace Palm Oil in Hot Dip Tinning. G. C. Ference and W. R. Johnson. *Iron Age,* v. 168, Aug. 2, 1951, p. 86-89.

Mill tests indicate that modified prime beef tallow can be a satisfactory substitute for palm oil in hot-dip tinning. It is cheaper, doesn't have to be imported, and doesn't need dewatering, preheating, or dilution with used oil. (L16, CN, Sn)

552-L. Etched Pattern Identifies Lighter Tinplate Coat. John Kolb. *Iron Age,* v. 168, Aug. 2, 1951, p. 90-91.

Positive identification of the more lightly coated side of dual tinplate is made possible by an etched dia-

mond pattern. This lightly etched marking results from acidified palm oil, applied at high speeds by a rubber roller. (L16, Sn)

553-L. Continuous Dip System Improves Tar Coating. F. R. Adams and G. E. Loftin. *Iron Age,* v. 168, Aug. 2, 1951, p. 92-94.

A continuous dipping system using a heated tar bath for cast-iron soil pipe and fittings which gives a coating superior to that produced where pipes are heated and then dipped. This bath is held at 300° F. and just enough residual heat for quick drying is retained. (L26, CI)

554-L. Corrosion and Scale Control. Edward N. Jones. *World Oil,* v. 133, Aug. 1951, p. 204, 208, 210.

The versatility of acids as well as correct application for removal of carbonate scale, cleaning well bores, and retrieving stuck liners. Case histories of wells successfully treated with scale-removing compounds are cited. (L12, ST)

555-L. Coatings for Underground Cables and Pipes. F. E. Kulman. *Paint and Varnish Production,* v. 41, Aug. 1951, p. 8-14, 32-33.

Coatings and coating practices on the underground cable and gas piping systems of the Consolidated Edison Co. of New York, Inc. and the conditions under which these coatings are installed and operating. Causes of cable corrosion. 11 ref. (L26, R8, Fe)

556-L. Electroformed Tooling. M. H. Orbaugh. *Automotive Industries,* v. 105, Aug. 1, 1951, p. 32-33, 86.

How electroformed tools are produced by electrodepositing Ni or Cu over the surface of a suitable matrix, usually cast phenolic, to an approximate thickness of ⅜ in. Removing the deposited shell forms the mold cavity. (L18, Ni, Cu)

557-L. Alodizing Navy Cutless Fighters Against Corrosion. *Automotive Industries,* v. 105, Aug. 1, 1951, p. 38-39, 78.

Coating of Al parts with alodine against corrosion. (L14, Al)

558-L. Maintenance by Metallizing. Gilbert C. Close. *Finish,* v. 8, Aug. 1951, p. 23-26, 78-80.

Mechanics of the metallizing process. From the metallurgical standpoint, the spray metal does not fuse with the surface on which it is applied, but secures a bond by keying and hardening around minute surface irregularities. Various applications. (L23)

559-L. Phosphate Base Glasses as Enamels for Aluminum and Its Alloys. Part I. J. W. Donahey, G. J. Morris, and B. J. Sweo. *Finish,* v. 8, Aug. 1951, p. 31-34, 58-59.

Lead-free enamels for Al and its alloys were developed which display good adherence and excellent surface texture. These enamels can be formulated in a wide range of colors, and metal pretreatment is simplified. The enamel is workable with a wide range of alloys. They are essentially alkali alumina-borophosphate glasses, the ground coat containing as an essential constituent copper oxide. 16 ref. (L27, Al)

560-L. Silver Plating on Inconel. Leslie J. Cook. *Review of Scientific Instruments,* v. 22, July 1951, p. 542.

Concerns the plating of Ag, 0.0002 in. thick, onto Inconel tubing, ⅜ in. in diam. The tubing is used as the center conductor of a coaxial cable. It was necessary for the Ag plating to have a conductivity of at least 90%. (L17, Ag, Ni)

561-L. Roller Coating Speeds Production. John E. Hyler. *Organic Finishing,* v. 12, July 1951, p. 15-16.

A process for painting metal and wooden strip. (L26)

562-L. New Uses for Cerametal Finishing. Robert B. Stanton. *Organic Finishing,* v. 12, July 1951, p. 17-19.

Applications and properties of cerametals. Production equipment. (L27)

563-L. Keeping Tractors in Service. Clyde B. Clason. *Welding Engineer,* v. 36, Aug. 1951, p. 26-29.

Reclamation of track rollers and idler wheels by automatic hard-facing. (L24, ST)

564-L. Liquid Blasting Cuts Die Polishing 10 Per Cent. *Western Machinery and Steel World,* v. 42, July 1951, p. 91.

At Rockford Drop Forge Co., metal surfaces are blasted with a high-velocity stream of nonmetallic abrasive particles suspended in an aqueous solution. (L10, TS)

565-L. Heat-Resistant Ceramic Coatings Broaden Low Carbon Steel Applications. *Steel,* v. 129, Aug. 13, 1951, p. 74-77, 96, 100.

Various types of ceramic coatings developed for use over a wide range of temperatures. Preparation of base metal. Thicknesses of coatings are 0.002-0.004 in. (L27, SS, CN)

566-L. Forgings Descaled 90 Per Cent Cheaper. *Steel,* v. 129, Aug. 13, 1951, p. 80-81.

A heated chemical bath which completely removes scale from steel forgings during quenching. Bath is made up of Pennsalt SR-4, dissolved in weak muriatic acid and water. (L12, J26, ST)

567-L. Maintaining Compressor Equipment. Frank H. Love. *Petroleum Engineer*, v. 23, July 1951, p. D19-D20, D22.

Metal spraying process applied to the reclaiming of piston rods in a compressor. (L23)

568-L. Materials of Construction for Pickling Operations Prior to Electroplating. E. A. Tice. *Plating*, v. 38, Aug. 1951, p. 826-830.

Corrosion resistant materials suitable for equipment employed in pickling and bright-dipping operations. 10 ref.
(L12, Fe, ST, Cu, Al, Zn)

569-L. Tentative Recommended Practice for Preparation of and Plating on Stainless Steel. *Plating*, v. 38, Aug. 1951, p. 837-838, 843-845.

A procedure for the production of smooth, adherent electrodeposits on stainless steel. Cleaning methods and solutions, rinsing, plating, and stripping techniques. (L17, SS)

570-L. Cleaning and Preparation of Metals for Electroplating. III. Degreasing Evaluation Tests: The Atomizer Test. Henry B. Linford and Edward B. Saubestre. *Plating*, v. 38, Aug. 1951, p. 847-855.

Theory which underlies all wettability tests and a detailed analysis of the reasons for the greater sensitivity of the atomizer test than of waterbreak and spray-pattern tests. The general theory of wettability of metals was discussed only in so far as it concerns the tests being employed. 253 ref. (L12, L17)

571-L. Tin Plate. Alfred E. Kadell. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 324-339.

Production methods for tin plate described. Emphasis is on plating and pickling, but rolling and annealing are also considered.
(L16, L17, F23, Sn, ST)

572-L. What Finish For Aluminum? *Canadian Metals*, v. 14, July 1951, p. 42.

Briefly discussed.
(L general, Al)

573-L. A Modern Phosphating Plant in Great Britain. D. Brownlie. *Canadian Metals*, v. 14, July 1951, p. 45.

Briefly described. (L14, ST)

574-L. Light Metal Chromed Cylinders. *Engineer*, v. 192, July 27, 1951, p. 115-117.

Developments in the use of Al for engine components. Process of coating Al cylinders with porous chromium, so that a lubricant can be held in the pores, reducing cylinder wear. (L17, Al)

575-L. The Surface Treatment of Aluminium and Magnesium. V. F. Henley. *Light Metals*, v. 14, July 1951, p. 378-388.

Mechanically produced finishes, chemical surface treatment, and electrochemical finishes. Equipment and tabulated data.
(L10, L12, L13, Al, Mg)

576-L. Tube Galvanizing Plant. *Metal Industry*, v. 79, July 27, 1951, p. 65.

The Witton Kramer magnetic-roll equipment in use at Stewarts & Lloyds, Ltd. in Britain. (L16, ST)

577-L. The Mechanism of Electrolytic Metal-Polishing. (In French.) W. J. McG. Tegart and R. G. Vines. *Revue de Métallurgie*, v. 48, Apr. 1951, p. 245-250.

It is theorized that the surrounding viscous layer, whose formation is influenced by diffusion, is a factor in producing, adjacent to the metal, an oxide film, which protects the surface and assures its uniform solution. The theory is also adequate to explain polishing effect for high current densities. Samples of Cu and Bi were used. 11 ref.
(L13, Cu, Bi)

578-L. Chemical Polishing of Aluminum and Its Alloys. (In French.) J. Herenguel and R. Second. *Revue de Métallurgie*, v. 48, Apr. 1951, p. 262-266.

Various acid baths used in the process and results obtained.
(L12, Al)

579-L. Variation of Rate of Anodic Oxidation With Orientation of the Crystal Face. (In French.) Jean Herenguel and Pierre LeLong. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, June 11, 1951, p. 2218-2220.

Studied using an Al alloy.
(L19, M26, Al)

580-L. Electrodeposition of Tungsten. Thick Deposits of Tungsten Alloys. (In French.) *Métallurgie et la Construction Mécanique*, v. 83, Mar. 1951, p. 199-201.

Shows that continuous use of various methods described is inexpedient because effect of anode dissolution on composition of bath and on voltage cannot be avoided. Various baths are unsatisfactory because of excessive loss of NH_3 at higher temperature. 10 ref. (L17, W)

581-L. High Temperature Galvanizing. The Problem of Zinc Supply. (In French.) A. Gordet. *Métallurgie et la Construction Mécanique*, v. 83, Apr. 1951, p. 297-301; May 1951, p. 197, 199.

For best results Pb content of Zn should not be greater than 1%. Proposes method for maintaining satisfactory Pb content. A study of Al additions is under way.
(L16, Zn, ST)

582-L. Metal and Plastic Coating of Copper, Tin, and Zinc. (In French.) Francais Hedde. *Métallurgie et la Construction Mécanique,* v. 83, June 1951, p. 485-486.

Metallizing guns used in the process, and some of the applications. (L23, Cu, Sn, Zn)

583-L. The Protal Process. (In French.) Léon Ades. *Revue de l'Aluminium,* v. 28, June 1951, p. 230-232.

The process is an exclusively chemical method designed for protecting light alloys against corrosion and providing a good surface for painting. Uses an aqueous solution of salts including F, Cr, and Ti which can be applied either by dipping or spraying. These salts form on surface of the metal a slightly porous and highly absorbing coat which, though thin, is adhesive. (L16, Al)

584-L. What Metal Should Be Used to Assure Successful Surface Treatment? (In French.) *Revue de l'Aluminium,* v. 28, June 1951, p. 239-242.

Presents tables which facilitate selection of grade of Al or Al alloys to use. Mechanical polishing, electrolytic or chemical polishing, anodization or bright anodic decoration, and Ni or Cr plating. (L, general, Al)

585-L. The Surface Treatment of Aluminum and Its Alloys. (In German and French.) B. Mauderli. *Aluminium Suisse,* May 1951, p. 98-105; July 1951, p. 125-135.

Various types of mechanical surface treatment and their effects on the properties of Al and its alloys, methods of degreasing and of pickling for purposes of cleaning, decorative effect, and protection against corrosion. (L10, L12, Al)

586-L. Metal-Sprayed Wood Patterns (In German.) R. Plümacher. *Giesserei,* v. 38, June 14, 1951, p. 281-282.

Procedure of spraying wood patterns with metal and its advantages. A photograph shows such a metal-sprayed pattern. (L23, E17)

587-L. Grain Size and Hardness of Nickel Deposits in Relation to Luster. (In German.) Harald J. Read and Rolf Weil. *Metalloberfläche,* sec. A, v. 5, July 1951, p. A97-A101.

Experiments indicate no definite correlation between luster and grain size or hardness. Includes electron micrographs, photomicrographs, tables, and graphs. (L17, M27, Q29, Ni)

588-L. High-Luster Nickel Plating. (In German.) Richard Springer. *Metalloberfläche,* sec. A, v. 5, July 1951, p. A101-A110.

Reviews the literature on methods. Advantages of process and properties of lustrous Ni deposits. 97 ref. (L17, Ni)

589-L. Cause and Elimination of Defects in Custom Electroplating. (In German.) Heinz W. Dettner. *Metalloberfläche,* sec. B, v. 3, July 1951, p. B97-B100.

Minimum standards and most frequent defects in articles Ni plated in small quantities. Various operations of good Ni-plating. (L17, Ni)

590-L. Combined Lustrous Tin-Nickel Plating. (In German.) N. Parkinson. *Metalloberfläche,* sec. B, v. 3, July 1951, p. B108.

Previously abstracted from *Metal Industry.* See item 402-L, 1951. (L17, Ni, Sn)

591-L. Ceramics for the Hot Spots. C. L. Foushee, Jr. *Aero Digest,* v. 63, Aug. 1951, p. 32, 93-96.

Work of Ryan Aeronautical Co. in application of ceramic coatings to exhaust manifolds of powerful new piston engines. Application procedures and test results. (L27, SG-h)

592-L. Wet Blasting Permits Direct Chrome Plating on Aluminum. H. E. Linsley. *American Machinist,* v. 95, Aug. 20, 1951, p. 120-121.

A new two-step process in which the Al article is cleaned by wet blasting, and immediately immersed in the plating bath. (L10, L17, Al)

593-L. Metallurgical Aspects of the Vitreous Enamelling of Cast Iron. A. L. Taylor. *Australasian Engineer,* June 7, 1951, p. 73-81.

Design of castings for enameling, foundry practice, composition, surface preparation, and frit making. Milling practice and mill speeds are also considered. (To be continued.) (L27, E11, CI)

594-L. Easier Way to Fight Salt Spray. Scott H. Reiniger. *Aviation Week,* v. 55, Aug. 20, 1951, p. 37-38.

A new process for the production of corrosion resistant metal surfaces is called "Alodizing." Performance data, methods of use and applications in industry. (L14)

595-L. Corrosion Prevention; Changing Techniques in Synthetic Resins. *Chemical Age,* v. 65, Aug. 11, 1951, p. 189-192.

The role of synthetic resins in the field of corrosion prevention. Major categories are bonding agents for brick linings in tanks; cements for floor construction; and surface coatings for metalwork and concrete. (L26)

596-L. Flame Spraying Plastics. John Starr. *Compressed Air Magazine,* v. 56, Aug. 1951, p. 209-211.

Application of polythene by heat-

ed spray to protect surfaces against corrosion. (L26)

597-L. Corrosion-Proof Cements Extend Pickling Tank Life. C. Fred Sauereisen. *Iron Age,* v. 168, Aug. 23, 1951, p. 66-68.

Life of steel-mill pickling tanks and other equipment exposed to acids and alkalis is extended and maintenance costs are cut where corrosion-proof cements are used. Combinations of chemical and thermal-setting cements and impervious membranes provide adequate protection from most corrosive chemicals. Includes selection chart. (L26)

598-L. Stainless on Copper Halts Lithium Attack. *Iron Age,* v. 168, Aug. 16, 1951, p. 114.

Work done for U. S. Atomic Energy Commission by W. K. Prater and L. O. Love. The Cu parts were sandblasted and sprayed with stainless steel, coating the parts approximately 0.015 in. thick, using a metal spray gun. (L23, Cu, SS)

599-L. Plating and Electroforming at Muzak. Walter M. Warner. *Metal Finishing,* v. 48, Aug. 1951, p. 66-68.

Equipment and procedures used by Muzak Corp. in manufacture of phonograph records and transcriptions. Vacuum metallizing, electroplating, and electroforming are each used at different stages of the process. (L17, L18, L23)

600-L. Current Distribution Over a Cylinder With Hemispherical Ends. Sidney Barnartt. *Journal of the Electrochemical Society,* v. 98, Aug. 1951, p. 311-317.

An investigation was made to design an electrode which, from geometrical considerations only, would yield relatively uniform distribution of current over the surface of a cylinder with hemispherical ends. The designing was carried out empirically by mapping equipotential surfaces in an electrolytic model. Current distributions derived from the equipotential maps were compared with the distributions of Cr electrodeposited from chromic acid solution. (L17, Cr)

601-L. Electrodeposition of Germanium. G. Szekely. *Journal of the Electrochemical Society,* v. 98, Aug. 1951, p. 318-324.

A process was developed for electrodepositing a substantial layer of metallic Ge which adheres well. Plating bath was a solution of $GeCl_4$ in propylene glycol and was operated at 50-60° C. (L17, Ge)

602-L. Abrasive Belts for Polishing. J. F. Whitcomb. *Metal Finishing,* v. 48, Aug. 1951, p. 46-48.

Applications and performance. Six case histories which show increased outputs and reduced costs for finishing of miscellaneous metal parts and products. (L10)

603-L. Tarnish-Resistant Treatments for Silverware. *Metal Finishing,* v. 48, Aug. 1951, p. 59-60.

Details of two electrolytic methods for passivating silver plate: the Price-Thomas method (British patent now lapsed) and nitrate-dichromate treatment. (L13, L14, Ag)

604-L. Bright Plating of Tin-Nickel Alloys. N. Parkinson and J. W. Price. *Metal Finishing,* v. 48, Aug. 1951, p. 61-63.

(Based on several papers presented at the 1951 Conference of the Electrodepositors Technical Society, England.) (L17, Sn, Ni)

605-L. Metal Cleaning in Aqueous Media. I. An Examination of the Problem. II. The Properties of the Materials to be Removed. III. The Initial Reactions in the Removal of a Residue. IV. The Complete Removal and Dispersal of Residues. V. Physical and Mechanical Assistance in Aqueous Degreasing Process. P. D. Liddiard. *Metal Industry,* v. 79, July 27, 1951, p. 63-64; Aug. 3, 1951, p. 91-93; Aug. 10, 1951, p. 107-109; Aug. 17, 1951, p. 123-127; Aug. 24, 1951, p. 151-153.

Part I: The necessity of cleaning metal surfaces, and suitable methods. Parts II and III: Fundamental questions concerning adhesion, wetting, spreading, contact angle, and equilibrium forces at surfaces. Part IV: materials which are available and evaluation of their use as cleaners. Data on surface-active compounds are tabulated. Part V: The forms of mechanical agitation found in degreasing practice. 20 ref. (L12)

606-L. The Hull Cell; Use in the Control of Electroplating Processes. J. W. Cuthbertson. *Metal Industry,* v. 79, Aug. 3, 1951, p. 87-90.

Principles of the cell, how it is used and its advantages. Application to the stannous fluoborate Sn-plating bath and the chloride-fluoride Sn-Ni bath are typical examples of dull and bright plating practice, respectively. (L17)

607-L. Plate Graining Standardization With Detailed Schedules of Graining Procedures. John O. Markward, Michael H. Bruno, and Robert F. Reed. *Modern Lithography,* v. 19, Aug. 1951, p. 32-35, 91, 93. (From Research Bulletin 17, "The Standardization of Graining Procedures," Lithographic Technical Foundation, New York.)

Machines, the stock-graining process, type and size of graining "marbles", abrasives, masking strips, re-

moval of dried ink, scale and oxidation, ghost images, permissible latitude, and preliminary cleaning. Data cover graining and regraining Zn deep-etch and albumin plates. (L26, Zn)

608-L. Study of Chromium-Frit-Type Coatings for High-Temperature Protection of Molybdenum. D. G. Moore, L. H. Bolz, J. W. Pitts, and W. N. Harrison. *National Advisory Committee for Aeronautics,* Technical Note 2422, July 1951, 39 pages.

The coatings were bonded to Mo specimens by firing in controlled atmospheres to temperatures in the range of 2400-2700° F. Durability of the coatings was then studied, principally by means of oxidation tests under load at 1500-1800° F. and by flame tests between 2000 and 3000° F. It was found that frit (glass), when used in conjunction with Cr, gave coatings with considerably better durability than similar coatings containing no frit. (L26, Mo)

609-L. Oxide Films; Their Effect on Tin Plate. J. G. Donelson. *National Lithographer,* v. 58, Aug. 1951, p. 36-37, 83-86.

Causes of oxide films and methods of retarding the film by treatment. Effects of oxide coatings on tin plate and methods of producing improved protective films that will be compatible with the best lacquers. (L14, Sn)

610-L. Maintenance Through Protective Coating. Robert H. Maloy. *Paper Mill News,* v. 74, Aug. 18, 1951, p. 64, 66, 68.

Some of the places and conditions in paper and pulp mills where heavy coatings can prevent corrosion, and in some cases insulate vessels and retard condensation. (L26)

611-L. Fight Corrosion With Plastics. Raymond B. Seymour and Earl A. Erich. *Petroleum Processing,* v. 6, Aug. 1951, p. 861-862.

Use of organic polymer coatings. 17 ref. (L26)

612-L. Controlled Etching of Zinc Photoengravings. Donald J. Byers. *Photoengravers Bulletin,* v. 41, Aug. 1951, p. 52-54.

Through research sponsored by Photo-Engravers Research, Inc., at Battelle Memorial Institute, effects of variables on rate and quality of etching provided by a splash machine have been clarified. Based on these studies, methods and equipment have been devised for controlling etching. (Complete information is available in a booklet published by Photo-Engravers Research, Inc., c/o Battelle Memorial Institute, Columbus, Ohio.) (L12, Zn)

613-L. Chrome Plating. Richard J. Dunne. *Printing Equipment Engineer,* v. 81, Aug. 1951, p. 48-49, 90, 92.

A new method of precision plating chromium on gravure cylinders to extremely close tolerances. Characteristics of the metal. (L17, Cr)

614-L. Plating Rotogravure Printing Rolls. Ezra A. Blount. *Products Finishing,* v. 15, Aug. 1951, p. 12-18, 20.

How printing rolls used in large, multiple-color, continuous printing presses are Cu plated, cut to size accurately and polished, etched with designs which will form the several colors, and Cr plated to insure long wear and sharp, clean impressions on the printed page. (L17, Cu, Cr)

615-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 15, Aug. 1951, p. 50, 52, 54, 56, 58, 60, 62, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92.

Reviews the following papers: "Recent Developments on Plating Methods and Equipment," R. B. Saltonstall and John V. Davis; "Factors Affecting Antifouling Paints," A. L. Alexander, R. I. Benemelis, and S. B. Crecelius; "Monel Pickling Equipment Gives Long Service Life," (International Nickel Co.); "Resistance and Capacitance Measurements Are Useful in Determining the Corrosion Resistance of Painted Steel," F. Wormwell and D. M. Brasher; and "Smoothing Metal Surfaces by Electroplating Avoids Cold Working Effects," Charles L. Faust. (L general)

616-L. Aluminum Architectural Products Anodized for Corrosion Resistance in Florida Plant. *Products Finishing,* v. 15, Aug. 1951, p. 94-96.

A process for anodizing Al parts so that Al products can be furnished as specified. (L19, Al)

617-L. Metallizes Bridges to Combat Brine Corrosion. *Railway Engineering and Maintenance,* v. 47, Aug. 1951, p. 707-709.

Procedure applied to bridge steel by the Missouri Pacific. A life of 20 years is said to be assured. The metal applied is Zn, which is fed in wire form through an oxy-acetylene flame and sprayed onto the steel surfaces. (L23, ST)

618-L. Electrodeposited Tin-Nickel Alloy Castings. N. Parkinson, S. C. Britton, and R. M. Angles. *Sheet Metal Industries,* v. 28, Aug. 1951, p. 757-767, 770.

Summarizes recent papers presented to the Electrodepositors' Technical Society on the electrodeposition and corrosion resistance of Sn-Ni alloy. Corrosion and tarnish resistance of this new alloy coating is

at least comparable with the traditional Cr on Ni.
(L17, R1, R2, Sn, Ni)

619-L. Versatile Finishing System Speeds Manufacture of Lubrication Equipment. Ralph Schirmer. *Steel,* v. 129, Aug. 20, 1951, p. 74-75.

Overhead conveyors carry sheet steel parts through spray cleaning, phosphating, drying, paint spraying, and baking areas, in finishing of equipment produced by Stewart-Warner for Alemite lubrication systems. (L12, L14, L26, ST)

620-L. Molybdenum Plating by Reduction of the Pentachloride Vapor. W. J. Childs, J. E. Cline, W. M. Kisner, and John Wulff. *Transactions of American Society for Metals,* v. 43, 1951, p. 105-121.

Previously abstracted from *American Society for Metals,* Preprint 8, 1950. See item 742-L, 1950.
(L25, Mo, Ni, CN)

621-L. Effect of Bath Composition on Aluminum Coatings on Steel. D. O. Gittings, D. H. Rowland, and J. O. Mack. *Transactions of American Society for Metals,* v. 43, 1951, p. 587-606; disc., p. 606-610.

Previously abstracted from *American Society for Metals,* Preprint 3, 1950. See item 741-L, 1950.
(L16, ST. CN, Al)

622-L. Anodic Polishing of Nickel in Electrolytes Containing Chloride Ions. (In French.) Sakae Tajima and Takemi Mori. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, July 9, 1951, p. 160-162.

Anodic behavior of Ni in HCl and various chloride solutions. For concentrations between one gram-molecule and saturation, current-tension curve shows the typical polishing effect. Surfaces thus obtained are passive. (L19, Ni)

623-L. Contributions to the Study of Electrolytic Polishing of Aluminum. (In French.) J. Plateau, G. Wyon, A. Pillon, and C. Crussard. *Métaux: Corrosion-Industries,* v. 26, June 1951, p. 235-249.

The electrolytic bath, practical conditions of polishing, and selectivity of polishing. (L13, Al)

624-L. Studies on the Electrolytic Polishing. (In English.) Sakae Tajima. *Japan Science Review,* v. 1, Dec. 1950, p. 49-60.

Methods were developed in Japan using acidic electrolytes for basic metals, alkaline electrolytes for acidic metals and acidic and alkaline electrolytes for amphoteric metals. Present status of the scientific and industrial applications. 43 ref. (L13)

625-L. Glass Mold Cleaning by Liquid Honing. George Ev. Spring. *American Ceramic Society Bulletin,* v. 30, Aug. 15, 1951, p. 264.

The process as used to clean iron molds for glass bottles and its advantages. (L10, Fe)

626-L. Cladding of Molybdenum for Service in Air at Elevated Temperature. W. L. Bruckart and R. I. Jaffee. *American Society for Metals,* Preprint 18, 1951, 23 pages.

Cladding of Mo with Ni was found to be a practical method of utilizing molybdenum's superior high-temperature strength under oxidizing conditions. Cladding materials other than Ni were found to result in poorer bonding. Inconel was the best of the other materials tried. Satisfactory joining and edge protection of clad Mo could be done using a suitable Ni-base filler metal and argon-arc or oxy-acetylene braze-welding techniques.
(L24, Mo, Ni)

627-L. Gas Evolution From Gray Cast Iron During Enameling. Lew F. Porter and Philip C. Rosenthal. *American Society for Metals,* Preprint 34, 1951, 21 pages.

By systematic control of the variables associated with dry-process enameling of gray cast iron, it was established that the major cause of gassing during the firing cycle is the evolution of carbon-oxide gases from the surface of the iron. These gases come from reaction between carbon from the iron and oxygen supplied by the atmosphere and evolve soon after the enamel is molten, with evolution increasing in intensity and finally ceasing after a period of time dependent on the furnace temperature. Hydrogen absorbed during melting does not cause gassing when gray cast iron is enameled, but hydrogen absorbed from extensive rusting or electrolytic treatments prior to enameling can cause defects. (L27, CI)

628-L. The Growing Role of Protective Coatings for Metals in High Temperature Service. W. N. Harrison. *American Society for Testing Materials,* "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 114-120; disc., p. 121.

Use of ceramic coatings. Work of the Bureau of Standards. Typical results. (L27, SG-h, ST)

629-L. Ceramic Coatings for Metals Offer Protection at High Operating Temperatures. *Ceramics,* v. 3, Aug. 1951, p. 321-323.

Briefly outlines recent work. (L27)

630-L. Corrosion Protection by Cold Phosphating; Russians Claim to Have Improved Process. *Chemical Age,* v.

65, Sept. 1, 1951, p. 295-296, 300. (Based on article by V. S. Lapatukin in *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 24, Apr. 1951, p. 373-382).

Details of process claimed to be superior to those developed in other countries. 14 ref. (L14)

631-L. Pressure Blasting; A Tool for Production and Maintenance Work. *Diesel Power & Diesel Transportation,* v. 29, Aug. 1951, p. 52-53.

Process and equipment for deburring, descaling, and general surface cleaning and finishing. (L10)

632-L. Specifications for Electrodeposited Coatings. Fielding Ogburn. *Electrical Manufacturing,* v. 48, Aug. 1951, p. 119-123.

Comparable specifications are tabulated. Kinds and uses for plated coatings. (L17, S22)

633-L. Phosphatize for Finish Quality. Gilbert C. Close. *Finish,* v. 8, Sept. 1951, p. 23-26.

The workings of the phosphating solution. The two processes currently used, and the basic steps of the phosphating process. (L14)

634-L. Producing Ceramic Coated Navy Motor Ship Mufflers. Gilbert C. Close. *Finish,* v. 8, Sept. 1951, p. 33-34.

The above are produced by applying a one-coat heat and corrosion resistant coating to parts ⅛ to 1 in. thick. The coating is mottled deep blue, very hard, and highly resistand to impact. (L27)

635-L. Phosphate Base Glasses as Enamels for Aluminum and its Alloys. Part II. J. W. Donahey, G. J. Morris, and B. J. Sweo. *Finish,* v. 8, Sept. 1951, p. 37-75.

Results of study of three cleaning methods to determine effect of surface etching on bond. Physical and chemical properties of enamels. (L27, Al)

636-L. Aluminized Cast Iron. M. G. Whitfield and V. Sheshunoff. *Foundry,* v. 79, Sept. 1951, p. 177-178, 180.

The aluminizing process in which following a cleaning operation, the article is immersed in a molten Al bath. Mechanical and corrosion resistant properties. Applications. (L16, Al, CI)

637-L. Efficient Use of Chromium-Cobalt-Tungsten Type Electrodes and Turning and Positioning Fixtures Facilitate Hard-Facing on a Production Basis. *Industry & Welding,* v. 24, Sept. 1951, p. 34, 37, 75-76.

Application of special hard facing alloys to rebuilding worn gasoline and diesel-engine valves. (L24, T5, Co, Cr, W, ST)

638-L. Ceramic Coatings Prevent Exhaust-Gas Corrosion. *Iron Age,* v. 168, Sept. 6, 1951, p. 118.

Tests on five heat resisting alloys under different coating conditions exposed to lead bromide. (L27)

639-L. A Method of Examining the Adhesion of Paint to Steel. S. C. Britton and R. M. Angles. *Journal of the Iron and Steel Institute,* v. 168, Aug. 1951, p. 358-363.

Reproducible method using cellulose adhesive tape developed to compare paints and methods of preparing steel for painting, by revealing the area of paint loosened by corrosion or by controlled physical damage. Manufacturing operations on coated tinplate were evaluated by a cupping test. Typical results show improved adhesion obtained by phosphating or tin plating before painting. (L26, ST)

640-L. Metallization & Electroplating of Wood, Glass & Plastics. S. K. Roy and B. C. Kar. *Journal of Scientific & Industrial Research,* v. 10A, June, 1951, p. 252-253.

For the electrodeposition of metals on a non-conductive substance, the surface of the latter must be rendered conductive. Wood is usually graphitized and glass and plastics are metallized. The conducting coating is then electroplated with copper, the copper deposit serving as an intermediate coating for top finish with other metals. (L17, L23)

641-L. HAE Coating for Magnesium. *Light Metal Age,* v. 9, Aug. 1951, p. 25.

Process for treating Mg surfaces which produces electrolytically a hard, adherent, refractory ceramic coating in a manner similar to anodizing. This coating was developed in the Pitman Dunn Laboratory, Frankfort Arsenal. (L27, Mg)

642-L. High Production Heat Treating Depends on Complete and Quick Scale Removal. *Magazine of Tooling and Production,* v. 17. Sept. 1951, p. 140-141, 151.

Use of a new-type chemical bath (Pennsalt SR-4) to remove scale in production heat treating of steel forgings. (L12, J general, ST)

643-L. Conservation of Nickel in Plating. *Metal Industry,* v. 79, Aug. 17, 1951, p. 128-130.

Recommended procedures for conservation. (L17, Ni)

644-L. The Protection of Metallic Surfaces in Chromium Diffusion. Part I. Survey of the Chromising Process. R. L. Samuel and N. A. Lockington. *Metal Treatment and Drop Forging,* v. 18, Aug. 1951, p. 354-359.

Historical development of chromizing processes, general theory of their mechanism from thermodynamic and kinetic standpoints, and present-day commercial practices. 13 ref. (To be continued.) (L15)

645-L. Metal Spraying Against Corrosion. *Mining Magazine,* v. 85, Aug. 1951, p. 119-120. (From paper by J. F. Atwell, *South African Mining and Engineering Journal,* June 23, 1950.)

Successful application of metal spray to a pipeline to prevent corrosion. Al is applied to the internal surfaces of steel pipe. (L23, Al, ST)

646-L. Metal Decoration Grows. C. W. Dickinson. *National Lithographer,* v. 58, Aug. 1951, p. 26-27, 86.

The metal-lithography industry. (L26)

647-L. Bake it Right! Christian F. Scheehle, Jr. *National Lithographer,* v. 58, Aug. 1951, p. 28-29, 96.

In metal decorating, every sheet that is lithographed must be dried or "baked" after each operation, that is, after the application of the sizing base, the coating, each lithographic print, and the finishing varnish. Various factors influencing the baking process. (L26)

648-L. Spray Painting Without a Spray Gun. *Organic Finishing,* v. 12, Aug. 1951, p. 8-11.

Electrostatic spray painting equipment and procedure. Application to metallic and non-metallic objects. (L26)

649-L. Preparation of Metal Surfaces for Organic Finishes. J. P. Mortelliti. *Organic Finishing,* v. 12, Aug. 1951. p. 12-14.

Various methods and specific treatments for steel, Al, Zn, Cu, and brass. (L26, ST, Al, Zn, Cu)

650-L. Compact Automatic Spray Painting. *Organic Finishing,* v. 12, Aug. 1951, p. 19-21. (L26)

651-L. Bonding Aluminum to a Ferrous Metal. *Overseas Engineer,* v. 24, Mar. 1951, p. 208-209.

The Al-Fin process. Its use improves heat dissipation from mechanically-worked surfaces such as pistons, cylinder barrels, and brake drums. (L22, Al, Fe)

652-L. Some Characteristics of Zinc Cyanide Plating Solutions. I. Appearance of Deposits and Cathode Current Efficiency. Gustaf Soderberg. *Plating,* v. 38, Sept. 1951, p. 928-932.

Tests made to determine effects of variations in Zn, NaCN, and NaOH concentrations upon the appearance of deposits, cathode current efficiency, Haring-cell throwing power, limiting anode-current density, and electrical conductivity of Zn $(CN)_2$ plating solutions. Effects on appearance and efficiency. Base metal was SAE1010 steel. (To be continued.) (L17, Zn, CN)

653-L. A New Device for Simplified Surface Tension Control. Joseph B. Kushner. *Plating,* v. 38, Sept. 1951, p. 933-935, 938.

Simple and rapid apparatus and procedure for surface-tension control in the plating shop capable of 5% accuracy or better. (L17, P10)

654-L. Ceramics for the Hot Spots. *Production Engineering & Management,* v. 28, Sept. 1951, p. 87-88.

The application of ceramics to such parts as exhaust collector systems on Stratocruisers is greatly extending the life of alloyed steels. Further studies are being made of ceramic materials to establish their value for Boeing B-50 bombers and C-97 military transports. (L27, SS, SG-h)

655-L. Pickling for Porcelain Enameling. I. The Spray Pickling Process at Kaiser Metal Products, Incorporated. Ezra A. Blount. **II. Pickling With Trioxide at the Estate Stove Company.** Frank L. Bonem. *Products Finishing,* v. 15, Sept. 1951, p. 12-15, 18-22.

Two processes and associated equipment. (L12, CN)

656-L. Conversion Coatings and Specification Finishes. C. O. Hutchinson. *Products Finishing,* v. 15, Sept. 1951, p. 26-30, 32, 34, 36.

Conversion coatings on treated steel surfaces and on nonferrous metals. Tabular correlation of government specifications for these coatings. (L14)

657-L. Cobalt Nodule Method Measures Adhesion of Electrodeposits. *Products Finishing,* v. 15, Sept. 1951, p. 40-41, 44, 46, 48.

Previously abstracted from "The Nodule Method of Measuring the Adhesion of Electrodeposited Coatings," Abner Brenner and Virginia Dare Morgan, *Proceedings, American Electroplaters Society.* See item 120-L, 1951. (L17)

658-L. Selection of Organic Coatings for Metal Products. *Products Finishing,* v. 15, Sept. 1951, p. 54, 56, 58, 62, 64, 66, 68, 70, 74, 76, 78. (Based on paper by M. A. Glaser.)

Factors influencing formulation; primer coatings; white baking enamel; avoiding gas checking; dipping enamel formulation; heat resistant finishes; and formulations to meet other requirements. (L26)

659-L. Electronic Painting; A Fast, Economical Finishing Method. Dan Reebel. *Steel,* v. 129, Sept. 3, 1951, p. 94-96.

Articles to be painted are moved past the spraying station on an overhead or spindle conveyor running at right angles to the projected spray. As the paint spray leaves the gun, it passes between two negative electrodes and enters a strong electrical

field set up by electrodes. In doing so, it picks up a negative charge and is attracted to the article to be coated, which is at ground potential. (L26)

660-L. Barrier Materials Seal Out Corrosion. *Steel,* v. 129, Sept. 10, 1951, p. 98.

Use of "Metalam" made by Dobeckmun Co., Cleveland, for military packaging in low-temperature service as well as in tropical and temperate climates. It consists of Al foil laminated to vinyl plastic film and polyethylene film and then to scrim cloth. It is largely impervious and the metallic layer resists oils, greases and organics in general. (L26)

661-L. Finishing Magnesium Alloys. *Steel,* v. 129, Sept. 17, 1951, p. 90-92, 114.

Methods for protecting magnesium by chemical treatment. They improve corrosion and wear resistance, adhesion of subsequent paint coatings, and surface appearance. (L14, Mg)

662-L. Kresky Pioneers Metal Sign Mass Production to Expand Operations. *Western Metals,* v. 9, Aug. 1951, p. 42.

Finishing operations in production of metal signs by Kresky Mfg. Co., Petaluma, Calif. (L26, ST)

663-L. Preparation of Metallic Surfaces Before Painting. (In French.) D. Bermane. *L'Ossature Métallique,* v. 16, June, 1951, p. 310-314.

Importance of cleaning metal surfaces. Various methods used as preparations for painting. (L12)

664-L. A Study of Electrolytically Polished Metallic Surfaces; Their Production, Practical Importance, and Chemical Properties. (In French.) P. A. Jacquet and M. Jean. *Revue de Métallurgie,* v. 48, July 1951, p. 537-546; disc., p. 545-546.

Electrolytically polished Cu, Zn, Mg, and Fe. Results are tabulated. 15 ref. (L13, Cu, Zn, Mg, Fe)

665-L. Cleaning Ferrous Metals. (In French.) G. Rossi-Landi. *Métallurgie et la Construction mécanique,* v. 83, July 1951, p. 544-545.

Choice of acid, duration of immersion, and preparation of bath. (L12, Fe)

666-L. Cleaning and Protecting of Iron, Aluminum, Magnesium and Their Alloys Against Corrosion. (In Italian.) Bruno Baldi. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 48-52.

Tests made with two new products used to clean above metals and prepare them for painting, and a galvanizing process for cleaning and passivation of magnesium and its alloys. (L12, Fe, Al, Mg)

667-L. Protection of Iron Against Corrosion by a New Cold-Phosphating Process. (In Italian.) F. Filippi and A. Nava. *Associazione Itáliana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 148-154.

Method consists of formation of a metallic phosphate film which is a good protective and anticorrosive surface covering. (L14, Fe)

668-L. (Book) **Electroplating for the Metallurgist, Engineer & Chemist.** J. B. Mohler and H. J. Sedusky. 257 pages. Chemical Publishing Co., 212 Fifth Ave., New York 10, N. Y. $5.00.

Important aspects of electroplating but without details on operation practice and electrochemical theory. Characteristics of the plating bath, nature of the deposit, composition of common plating baths, control methods, and analytical procedures. (L17)

669-L. (Book) **International Conference on Hot Dip Galvanizing.** 161 pages. Zinc Development Association, Oxford, England.

An account of the first international conference on hot dip galvanizing, held at Copenhagen, July 17-21, 1950. Chapter headings are: Fundamental aspects of hot dip galvanizing and dry galvanizing; galvanizing residuals and their treatment; corrosion resistance of galvanizing. A list of references and a subject index are also included. (L16, ST, Zn)

670-L. (Pamphlet) **Plating-Room Controls for Pollution Abatement.** July 1951, 20 pages. Metal-Finishing Industry Action Committee, Ohio River Valley Water Sanitation Commission, 414 Walnut St., Cincinnati 2, Ohio. 50c.

Recommended procedures and equipment. The information is primarily designed to aid in reduction of stream pollution, but also helps reduce operating costs of metal-finishing plants. (L17, A8)

671-L. (Book) **Die Betriebsüberwachung und Untersuchung Galvanischer Bäder und Niederschläge.** (Plant Control and Investigation of Galvanic Baths and Deposits.) Ed. 2. Hugo Krause. 251 pages. 1949. Carl Hanser Verlag, Munich 27, Germany.

Methods of investigating physical and chemical properties of baths and of metallic and nonmetallic coatings. Concluding section deals with chemical and electrolytic processes of testing metallic coatings and nonmetallic protective coatings. (L16, L17

672-L. Spray Gun Bonderizing; A Pyrene Cold Pre-Treatment Process.

Automobile Engineer, v. 41, Sept. 1951, p. 340.

An addition to the range of metal pretreatment and rustproofing processes marketed by Pyrene Company, Ltd., Middlesex, England. (L14, ST)

673-L. More About Protecting Your Steel. *Chemical Engineering,* v. 58, Sept. 1951, p. 167-170.

A review of a recent article. Novel approaches to the problem which emerged from the survey are elaborated on. (L general, ST)

674-L. Help Your Steel to Hold Its Protective Coating. A. J. Liebman. *Chemical Engineering,* v. 58, Sept. 1951, p. 326, 328, 330-331.

Various techniques in bonding of paint to metal to prevent corrosion. (L14, L26, ST)

675-L. Paint Finishing of Steelcraft Building Products. *Industrial Heating,* v. 18, Sept. 1951, p. 1628-1630, 1634-1640.

Equipment and methods. (L26, ST)

676-L. Cans: A New Rival for Tinplate. Bill Packard. *Iron Age,* v. 168, Sept. 20, 1951, p. 72.

Two new processes developed by Reynolds Metal Co. One process uses heavy Al foil and plastic. The other welds a permanent bond of Al foil onto steel sheets. Either process would replace scarce tin. (L22, L24, Al, ST)

677-L. Vitreous Enamelling; Use of Electric Furnaces for Firing. *Iron and Steel,* v. 24, Sept. 1951, p. 445-446.

The modern method of applying the heat required in the enameling. Operation and maintenance of the electric furnaces. (L27)

678-L. Sulphuric-Acid Anodizing. *Light Metals,* v. 14, Sept. 1951, p. 526-528. (Based on paper by V. F. Henley.)

Conditions for the production of successful films. Suitability of these films for subsequent dyeing processes. (L19, Al)

679-L. Electrostatic Atomization of Paint Reduced Cost of Metal Finishing. *Machinery,* (American), v. 58, Sept. 1951, p. 185-186.

How paint is atomized into a fine spray of electrically charged particles, which are instantly drawn to metal parts carried along a conveyor line in a process recently developed by the Ransburg Electro-Coating Corp., Indianapolis, Ind. (L26)

680-L. Sinclair Evaluates Neoprene Coatings for Tanker Fleet. W. N. Damonte and T. T. Wilkinson. *Marine Engineering and Shipping Review,* v. 56, Oct. 1951, p. 40-47.

Trial applications of neoprene on sea valves, circulators, heat-exchanger heads, and other equipment similarly exposed to sea-water corrosion. Schematic diagram of the testing. (L26, R4)

681-L. Rare Earths in Aluminum Baths Give Attractive Hot-Dip Coatings. Webster Hodge and E. M. Smith. *Materials & Methods,* v. 34, Sept. 1951, p. 95-96.

Experimental work shows that addition of rare-earth alloying metals to hot-dip Al baths gives smooth coatings on mild-steel parts without use of a flux. (L16, Al, EG-g)

682-L. The Production of Colored Gold Finishes. Edmund R. Thews. *Metal Finishing,* v. 49, Sept. 1951, p. 80-85.

Methods for production are by alloy gold plating, deposition of light, translucent gold films, alloying with the undercoat by diffusion, or etching treatment. Factors affecting deposits. (L17, L15, Au)

683-L. Electrodeposition in Marine Engineering. I and II. R. E. Wilson. *Metal Industry,* v. 79, Aug. 31, 1951, p. 171-174; Sept. 14, 1951, p. 221-223.

Use of electrodeposition for providing considerable thicknesses of wear resisting metals on various parts and equipment used in marine engineering, largely for salvage of worn components. (L17, T22)

684-L. A Prosperous Metal Finishing Firm. *Modern Metals,* v. 7, Sept. 1951, p. 47-50.

Operations of the Chicago Thrift-Etching Corp., which is equipped for anodizing, plating, etching, polishing, or enameling a complete range of metals. Methods of manufacture of the Alumilite processed aluminum identification plate which was originated by this company. (L general)

685-L. Factors Affecting the Testing of Automotive Finishes. Ralph J. Wirshing and Wardley D. McMaster. *Paint and Varnish Production,* v. 41, Sept. 1951, p. 13-18, 32.

Data on adhesion tests and others. (L26)

686-L. Color Effects in Electrographic Printing. Max Kronstein. *Paint and Varnish Production,* v. 41, Sept. 1951, p. 19-21, 36.

Development of the above as it can be utilized as a test method for paint on metals. A new approach to the study of corrosion. Tests were made of coatings over base and phosphate-treated steels. (L26, R11, ST, Al)

687-L. Refractory Coatings on Mild Steel. *Sheet Metal Industries,* v. 28, Sept. 1951, p. 865.

A finishing process called "Stoneclad" gives mild steel protection up to 800° C. Applications. (L27, CN)

688-L. Plug Welding Technique in Clad Lining Dough Mixer Bowls. W. M. Davis. *Welding Journal,* v. 30, Sept. 1951, p. 829-831.

Improved operations and a 30% direct labor saving are results of above technique developed for welding stainless steel clad sheet to heavy gray-iron castings used as end members on large mixing bowls, at J. H. Dry Co., Inc., Cincinnati, Ohio, makers of mixing equipment for bakery, chemical, paint, and allied fields. (L22, SS)

689-L. Surface Preparation for Metallizing Shafts and Similar Objects. Peter G. Dennison. *Welding Journal,* v. 30, Sept. 1951, p. 835-836.

Method developed in 1938 and kept as a trade secret until recently by Metal Spraying Corp., Milwaukee. It involves threading and knurling prior to metal spraying. (L23)

690-L. VPI Wrap for Wire Protection. D. W. Light. *Wire and Wire Products,* v. 26, Sept. 1951, p. 759-761, 801-802.

Describes patented product and system of rust prevention developed by Shell Development Co. VPI Wrap is a special neutral paper coated on one side with a synthetic organic chemical that has powerful corrosion-inhibiting qualities. The wrap is particularly valuable when packaging wire and other products and surfaces that are not easily reached by conventional contact inhibitors. (L26, R10)

691-L. The New Tin Nickel Alloy Electroplate. *Wire Industry,* v. 18, Sept. 1951, p. 794, 797. (Reprinted from "Tin and It's Uses," Tin Research Institute.)

A new plated finish is composed of 65% Sn and 35% Ni. It can be deposited directly on Cu and Cu-base alloys, but in the case of steel a Cu undercoat is recommended. (L17, Cu, ST, Sn)

692-L. Cleaning with Sodium Hydride. (In French.) *Métallurgie et la Construction Mécanique,* v. 83, Aug. 1951, p. 602-603.

Cleaning of steel ingots. Advantages of process and examples of application. (L12, ST)

693-L. Chromium Plated Aluminum. *Canadian Metals,* v. 14, Sept. 1951, p. 48.

Various plating methods and some applications. (L17, Al)

694-L. Hot Dip Galvanizing; American and British Methods Compared. *Chemical Age,* v. 65, Sept. 1951, p. 401-403.

Shop construction and equipment, dipping techniques, and treatment of residues. (L16, Zn, CN)

695-L. Contact Tin Plating With a Difference. J. K. Wilson and O. Wright. *Electroplating and Metal Finishing,* v. 4, Sept. 1951, p. 274-276.

Exceptionally dense and adherent tin coatings can be formed on most metals, including cast iron, many alloy steels, brass, and copper, by simple immersion in contact with Al in the hot stannate solution normally used for electroplating. Contact tinning may be of value as an undercoat, in the electroplating of cast iron, in the prevention of fretting corrosion of contacting surfaces, and for the protection of springs and of aircraft radiators and oil coolers. (L16, Fe, AY, Cu, Sn)

696-L. Modern Practice in Hot Dip Galvanizing. R. W. Bailey. *Electroplating and Metal Finishing,* v. 4, Sept. 1951, p. 277, 280.

The Sendzimir process in use by John Summers and Sons at Shotton, England. (L16, Zn, CN)

697-L. Vapor Deposition of Metals on Ceramic Particles. James E. Cline and John Wulff. *Journal of the Electrochemical Society,* v. 98, Oct. 1951, p. 385-387.

Coating of ceramic particles with metal by vapor deposition for the production of high-temperature metal-ceramic bodies. Methods for coating particles of ceramics such as SiO_2, SiC, and Al_2O_3 with Mo deposited by H_2 reduction of molybdenum pentachloride and with Ni deposited by decomposition of nickel carbonyl. (L25, Mo, Ni, Fe)

698-L. The Basic Types of Phosphate Coatings and Where to Use Them. Robert F. Ayres. *Materials & Methods,* v. 34, Oct. 1951, p. 100-103.

Includes a table of the types and applications of phosphate coatings. These coatings are applied to Fe steel, Zn, Cd, and Al by spraying, dipping, or painting. (L14)

699-L. Waxes Now Used to Process as Well as Protect Materials. Kenneth Rose. *Materials & Methods,* v. 34, Oct. 1951, p. 104-107.

Classifies waxes as animal, vegetable, mineral, and synthetic. The properties of waxes which are of industrial importance, the forms of waxes, and their application. Waxes used as protective films, ingredients in compounded materials, wetting agents, low-temperature fusing constituents, and lubricants for metal processing. (L26, F1)

700-L. Hot-Dip Galvanizing of Cold-Rolled Strip. H. Bablik, F. Gotzl, and R. Kukaczka. *Metal Industry,* v. 79, Sept. 21, 1951, p. 241-243.

Methods used and nature of the surface required for galvanizing. Test data are tabulated. (L16, CN, Zn)

701-L. Improving Bendix Airplane Landing Wheels by Burnishing. W. H. DuBois. *Metal Progress,* v. 60, Sept. 1951, p. 55-59.

Tests were made on full-scale models of relatively complicated aircraft wheels cast in Mg alloys. Compares ball peening, and burnishing or rubbing. Difficulties and techniques involved. Feasibility of using these treatments on production parts. (L10, Mg)

702-L. Quick Patina on Copper, Brass, or Nickel Alloys. William G. Schneider. *Metal Progress,* v. 60, Sept. 1951, p. 74-76.

Patina is a natural coloration which develops on these alloys after long periods of atmospheric exposure. It is desirable to have a method for rapidly producing an artificial patina so that repaired sections of roofs, etc., will have the same appearance as the older material. A chemical solution process is said to give satisfactory results. (L14, Cu, Ni)

703-L. Phosphate Coatings. Alfred Douty. *Plating,* v. 38, Oct. 1951, p. 1030-1033.

Compares phosphate coating and electroplated coatings. Types recommended for various metal surfaces. (L14, ST, Fe, Zn, Cd, Al)

704-L. Chromate Treatments. Charles W. Ostrander. *Plating,* v. 38, Oct. 1951, p. 1033-1035.

Characteristics of chromate solutions and coatings. Types of solutions and their applications. (L14)

705-L. Black Oxide Coatings on Metals. Walter R. Meyer. *Plating,* v. 38, Oct. 1951, p. 1036-1937.

Features of the coatings on iron, steel, copper, and aluminum. (L14, Fe, ST, Cu, Al)

706-L. Organic Coatings in Today's Metal Finishing. Donald R. Meserve. *Plating,* v. 38, Oct. 1951, p. 1037-1039.

A few of the ways in which organic coatings have been used to protect metal parts. (L26)

707-L. Porosity of Electrodeposited Metals. X. Hydrogen Content of Electrodeposited Metals. N. Thon, Denis G. Keleman, and Ling Yang. *Plating,* v. 38, Oct. 1951, p. 1055-1058.

Tests on steel, Cu, Cr, Ni, and Fe; which showed different forms of occlusion of H_2. Results show that H_2 can exist in a metal in at least three forms. (L17, Ni, ST, Fe, Cu, Cr)

708-L. A Modern Approach to a Production Problem. *Production, Engineering & Management,* v. 28, Oct. 1951, p. 79-81.

Recent strides take in the application of power brushing to deburring work have resulted in worthwhile savings on many high-volume operations. (L10)

709-L. Ceramics for the Hot Spots. James Blane. *Western Machinery and Steel World,* v. 42, Sept. 1951, p. 88-89, 100.

Application of ceramic materials in protecting steels at temperatures above 1900° F. (L27, ST)

710-L. Descaling Hot Rolled Steel Strip, Bars and Rods. R. O. Peterson. *Western Machinery and Steel World,* v. 42, Sept. 1951, p. 103.

A mechanical brushing method that not only removes scale but also improves the surface and the physical characteristics of the article in preparation for further processing. (L10, ST)

711-L. Electrolysis of Phosphoric Acid Between Copper Electrodes. Electrolytic Polishing. (In French.) Denise Laforgue-Kantzer. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Aug. 20, 1951, p. 547-550.

Solution of the anode takes place in two stages, while polishing occurs to the degree that a hydroxylated acid phosphate which constitutes the "viscous layer", exists in equilibrium with the oxide on the electrode surface and with the acid in solution. (L13, Cu)

712-L. Silicones. IV. Process of Producing High-Contrast Printed Characters on Electrolytically Oxidized Light-Metal Surfaces. (In German.) H. Reuther and R. Muller. *Chemische Technik,* v. 3, June, 1951, p. 177-178.

A new printing process in which the electrolytically thickened layer of Al_2O_3 is treated with reducing silico-organic substances and then printed with a reducible-metal-salt solution. (L26, Al)

713-L. Metallurgical Aspects of the Vitreous Enamelling of Cast Iron. (Conclusion.) A. L. Taylor. *Australasian Engineer,* July 7, 1951, p. 69-73.

Concludes literature review with sections on applications and firing and on enamel defects. 96 ref. (L27. CI)

714-L. A Look Into the Future of Enamel Furnace Design. E. W. Dany. *Finish,* v. 8, Oct. 1951, p. 32-35, 91.

Possible design of the continuous enameling furnace in 1971. Some advanced present types. (L27)

715-L. New Ceramic Coatings for Jet Engine Parts. Gilbert C. Close. *Finish,* v. 8, Oct. 1951, p. 27-29, 90-91.

"Solaramic" process developed by Solar Aircraft Co., San Diego, for applying a vitreous coating as thin as 0.0005 in. to alloy metals with resultant longer life and reduction in critical materials used. Material coated is stainless steel. (L27, SS)

716-L. The Production of Mirror Finish. F. Cattin. *Industrial Diamond Review,* new ser., v. 11, Sept. 1951, p. 194-198. (Translated from *Industrielle Organisation,* v. 19 (1), 1950, p. 10-12).

A new working method, completely mechanical, which produces extreme surface finish, and at the same time dimensional accuracy and can equally well be applied to cylindrical or tapered workpieces. (L10)

717-L. Good Plating Techniques Save Money, Cut Stream Pollution. *Iron Age,* v. 168, Oct. 18, 1951, p. 99-101.

Study by Ohio River Valley Sanitation Commission which shows that much valuable plating materials now wasted in streams can be salvaged and reused. (L17, A8)

718-L. The Pigment Vehicle Relationship in Anti-Corrosive Paints. J. E. O. Mayne, *Journal of the Oil & Colour Chemists' Association,* v. 34, Oct. 1951, p. 473-479; disc., p. 480.

The inhibition of corrosion of iron and steel by paints. The theory of corrosion is briefly reviewed together with certain general properties of unpigmented paint films. The pigments are divided into the following classes: inert, basic, and soluble. 21 ref.. (L26, R10)

719-L. Vacuum Metallizing. Philip Rosenblatt. *Machine Design,* v. 23, Oct. 1951, p. 141-144, 180, 182.

The process, properties and applications of the coatings. (L23)

720-L. A New Finish for Magnesium Alloys. Harry A. Evangelides. *Metal Finishing,* v. 49, Oct. 1951, p. 56-60.

HAE coating recently developed at Frankford Arsenal is produced by an electrolytic process and is ceramic and refractory in character. Corrosion-test results. (L13, R general, Mg)

721-L. Practical Barrel Finishing. Parts I and II. Peter L. Veit. *Metal Finishing,* v. 49, Sept. 1951, p. 71-77, 88; Oct. 1951, p. 70-73.

Part I emphasizes the three main factors which give flexibility to barrel-finishing operations: type of medium, condition of the medium, and the barrel compound. Part II: some general aspects of barrel-finishing practices. The general treatment of metals, including the functions of cleaning and bright dipping. (To be continued.) (L10)

722-L. Calculating Metal Cost in Indium Plating. *Metal Finishing,* v. 49, Oct. 1951, p. 81.

Chart facilitates calculation. (L17, In)

723-L. The "Onera" Bright Chromizing Process. Bernard Jousset. *Metal Progress,* v. 60, Oct. 1951, p. 76-77.

New process developed by a French organization whereby perfectly regular, smooth, and bright layers can be obtained in a single operation. These layers are highly resistant to corrosion caused by atmosphere, salt, nitric acid, and high temperature. No layers can peel or scale off from thermal or mechanical shock, because the surface layer is an integral part of the base metal. In the Onera process, gaseous chromium fluoride decomposes or "cracks" at the surface of the steel parts, the Cr diffuses into the metal, and the HF recombines with Cr chips, packed in with the steel articles. (L15, ST, Cr)

724-L. Properties of Electroplates. *Metal Progress,* v. 60, Oct. 1951, p. 182, 186, 188, 190. (Condensed from "The Physical and Engineering Properties of Electrodeposited Metals," J. S. Anderson.)

Previously abstracted from *Electroplating and Metal Finishing.* See item 8-307, 1949. (L17)

725-L. High Temperature Protection of Mild Steel by Refractory Facings. *Metallurgia,* v. 44, Sept. 1951, p. 144. (Condensed from Report No. 50/4/73 prepared by the Industrial Gas Development Committee of the Gas Council.)

Applications and test results are included. (L27, CN)

726-L. New Wet Blast Machine Designed Through Field Research. E. E. Brodhag. *Metal Treating,* v. 11, Sept.-Oct. 1951, p. 4-5.

Equipment designed by American Wheelabrator & Equipment Corp., Mishawaka, Ind., for removing heat treating scale from metal surfaces. Typical results are illustrated. (L10)

727-L. The Protection of Metallic Surfaces by Chromium Diffusion. Part II. Theoretical Considerations. R. L. Samuel and N. A. Lockington. *Metal Treatment and Drop Forging,* v. 18, Sept. 1951, p. 407-415.

Theoretical aspects of all processes, by which one metal is coated with another by chemical deposition from the gas phase at high temperatures, with particular reference to iron and steel. 13 ref. (To be continued.) (L15, Fe, CN)

728-L. A Versatile Production Finishing Plant. Jules Horelick. *Products Finishing,* v. 16, Oct. 1951, p. 14-20, 22.

Equipment and procedures of Allied Research Products, Inc., a job-plating plant in the Middle Atlantic area. Chemical coatings are also applied when desired. Details of some of the solutions employed. (L17)

729-L. Substitute Finishes Are Better Than You Think. *Product Engineering,* v. 22, Oct. 1951, p. 143.

Particular reference is made to a need for a substitution for the conventional Cu-Ni-Cr electroplate on steel. Typical substitute finishes are tabulated. (L17, ST, Cu, Ni, Cr)

730-L. Finishes for Aluminum Products. R. V. Vanden Berg. *Product Engineering,* v. 22, Oct. 1951, p. 179-186.

Electrochemical, organic, ceramic, mechanical, and chemical finishes for Al and Al alloys. (L general, Al)

731-L. Modern Hot-Dip Galvanizing. Raymond F. Ledford. *Products Finishing,* v. 16, Oct. 1951, p. 26-30, 32.

Principles and practical procedures. (L16, CN, Zn)

732-L. Hard Chrome Plating in Spain. F. R. Morral. *Products Finishing,* v. 16, Oct. 1951, p. 54, 56.

(L17, Cr, ST)

733-L. Spotlighting Finishing Progress. Advances in Mechanical Finishing Open Up New Possibilities. Allen G. Gray. *Products Finishing,* v. 16, Oct. 1951, p. 68, 70, 72, 74, 78, 80, 84, 86, 88, 90, 92, 94, 96, 98, 100.

Extensive illustrated survey. (L10)

734-L. Present-Day Methods for Copper Plating Iron and Steel and for Nickel Plating Copper Alloys (Copper, Brass, Bronze). (In French and German.) Roger Zirilli. *Pro-Metal,* v. 4, Feb. 1951, p. 778-792.

(L17, Cu, Ni, Fe, ST)

735-L. A Student's Approach to the Theory and Practice of Vitreous Enamelling. J. H. Gray. *Sheet Metal Industries,* v. 28, Sept. 1951, p. 853-864.

Equipment and procedures. General principles of design and preparation of sheet iron for enameling. (To be continued.) (L27, Fe)

736-L. Surface Treatment and Finishing of Light Metals, Part 7. S. Wernick and R. Pinner. *Sheet Metal Industries,* v. 28, Oct. 1951, p. 947-954.

Discussed from the viewpoint of the effect of alloy composition, film properties, impurities and operating conditions. A comparison is made between sulfuric acid and chromic acid processes. Other processes are mentioned. 25 ref. (To be continued). (L17, Al, Mg)

737-L. Modern Developments in the Effective Utilization of Organic Finishes. H. J. Testro. *Sheet Metal Industries,* v. 28, Oct. 1951, p. 955-960, 962.

Methods are classified and described. Covers dipping, flow-coating, roller-coating, tumbling, whirling, and silk screening. (L26)

738-L. Tough Coating Opens Way to New Uses of Porcelain Enamel. *Steel,* v. 129, Oct. 15, 1951, p. 84.

Ti-Loc process developed by Strong Mfg. Co., Sebring, Ohio, for application of shock resistant porcelain enamel coatings to nonpremium steel in a one-coat process. A white Ti cover coat is used. (L27, CN)

739-L. Conservation in Enameling Operations. Evan M. Oliver. *Better Enameling,* v. 22, Oct. 1951, p. 6-7, 22-23, 28, 32.

Storing, milling, reclaiming, dipping, slushing, spraying, firing, and reworking defective ware. (L27)

740-L. Mt. Vernon Furnace & Mfg. Co. *Better Enameling,* v. 22, Oct. 1951, p. 8-13.

Metal forming, frit milling, metal preparation, and enamel application and processing. (L27, G general)

741-L. Hard Chrome Surfacing for Crankshafts. Richard S. Love. *Diesel Power & Diesel Transportation,* v. 29, Oct. 1951, p. 56-58.

Procedures and equipment. (L17, Cr, ST)

742-L. Regrinding and Metallizing Crankshafts. *Diesel Power & Diesel Transportation,* v. 29, Oct. 1951, p. 59-61.

Recommended repair and maintenance procedures. (L23, ST)

743-L. Cements. C. R. Payne. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2203-2207.

Improved reinforced furan-resin linings bonded to steel which are serving as substitutes for corrosion resistant metal alloys in the construction of reactors, tanks, towers, and fume ducts. Fundamental factors influencing the service life of acid-proof brick linings in sulfite digesters. A number of improvements were made in the physical and chemical properties of acid-proof cements, and new techniques of application were developed to extend the range of their industrial uses. 105 ref. (L27, ST)

744-L. Hydrodynamics of Cathode Films. Garbis H. Keulegan. *Journal of Research of the National Bureau of Standards,* v. 47, Sept. 1951, p. 156-169.

A hydrodynamical theory of the cathode diffusion layer is based on the assumption of uniform density reduction at the cathode surface. By means of an approximate solution for the flow and the diffusion equation, layer dimensions, velocity

distributions, and densities were determined. Further derivations from the solutions directly applicable to results obtained by the freezing method were made. The data of Brenner on Cu and Ni baths are considered. Using observed values of density reductions at the cathode surface, maximum width of the layer, average densities for a given distance from the cathode and mobilities of the cations were determined and compared with observations. (L21)

745-L. Italian Electroplating Industry. Giuseppe Bianchi. *Metal Industry,* v. 79, Oct. 5, 1951, p. 298-299. (L17)

746-L. Improved Enamels Extend Life of Steel Chlorination Pipe. L. E. Dube and Norman Stromdahl. *Steel,* v. 129, Oct. 22, 1951, p. 70-72, 99.

How compositions and firing techniques were modified to ease the corrosion problem in black pipe used for fluxing and degassing Al alloys. Average life of 10 min. is multiplied 15 to 25 times, without excessive cost increase. (L27, ST)

747-L. Plating Room Controls Cut Operating Costs, Curb Stream Pollution. *Steel,* v. 129, Oct. 29, 1951, p. 66-68. (Based on "Plating-Room Controls for Pollution Abatement," *Metal Finishing Industry Action Committee; Ohio River Valley Sanitation Commission,* July 1951.)

Previously abstracted from original. See item 670-L, 1951. (L17, A8)

748-L. Recent Ceramic Coating for High-Temperature Alloys. *Technical News Bulletin* (National Bureau of Standards), v. 35, Oct. 1951, p. 145-147.

New developments at National Bureau of Standards under sponsorship of NACA. The latest development, known as "A-417", is applied by spraying or dipping and is then fired for a few minutes at 1850° F. (L27)

749-L. Process Control in Making Enameled Wire. R. F. Thompson. *Wire and Wire Products,* v. 26, Oct. 1951, p. 885-887, 997-998.

Either a dip or a die process may be used in applying the coating to enameled magnet wire. Advantages and disadvantges of each under various circumstances. Details of dip process as used by Westinghouse at Buffalo, with emphasis on control methods and apparatus. (L27, Cu)

750-L. Depolarizing Agents and Their Effects and Savings in Cleaning of Rods and Wire. Joseph T. Irwin. *Wire and Wire Products,* v. 26, Oct. 1951, p. 899-901, 994-996.

Work with depolarizers in acid pickling of iron and steel. Laboratory findings and actual production results in steel mills and fabricating plants. The agents emphasized are produced by Azed, Inc., Waukegan, Ill. (L12, ST)

751-L. A Progress Report on the Development of the Wheelabrator Mechanical Cleaning Process. Gilbert D. Dill. *Wire and Wire Products,* v. 26, Oct. 1951, p. 910-913, 992-993.

Use in the steel industry in general and in the cold rolling and cold drawing divisions in particular. (L10, ST)

752-L. Liquid Chemical Blanket for Hot Galvanizing Surfaces. A. A. Paterson. *Wire and Wire Products,* v. 26, Oct. 1951, p. 918-919, 989.

The formation of oxides on galvanizing pans is the cause of loss each year of millions of pounds of pure zinc in the galvanizing industry. A method of overcoming the problem would be use of a liquid which would completely seal the surface of the spelter pan from the atmosphere. After some unsuccessful experiments with various combinations of $ZnCl_2$ and NH_4Cl, a compound (composition not given) said to give good results was developed. Cost savings and several other advantages. (L16, Zn, Cn)

753-L. Catalytic Combustion in Wire Enameling. R. J. Ruff. *Wire and Wire Products,* v. 26, Oct. 1951, p. 936-939, 987-988.

Equipment and procedures designed to alleviate air-pollution problems resulting from the fumes given off from enameling operations. It is a low-temperature oxidation process which occurs when burnable fumes are simply passed through a stationary, porous, essentially permanent catalytic element. (L27)

754-L. Application of Electropolishing and X-Rays to the Study of Hard Chromium. Preliminary Results Concerning the Influence of the Surface Condition of the Steel Base. (In French.) P. A. Jacquet and A. R. Weill. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 4-20.

The relationship between treatment of the surface of the steel and properties of Cr deposits was investigated. Compares in particular the structure and properties of steel polished mechanically and electrolytically. 13 ref. (L13, L17, M27, ST, Cr)

755-L. Evolution of Industrial Application of Hard Chromium in France. (In French.) De Buyer. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 22-27.

Reviews the history of hard-chro-

mium applications, present day usage, and future possibilities in France. (L17, Cr, ST)

756-L. Magnetic Control of Chromium Thickness. (In French.) Brachet. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 28-31.

Various methods based either on attraction or induction, and devices of measuring used in France, the U. S. and Germany. (L17, Cr, ST)

757-L. Hard Chromium Plating of Gages. (In French.) Meynier. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 32-36.

Experiments on thin hard-chromium plating of simple and threaded gages for cnecking screw threads. Shows that it is possible to re-cover used gages by removing the old layers of thin hard Cr, and plating them again. (L17, Cr, ST)

758-L. Experiments on the Use of Hard Chromium in Hand Glass Making. (In French.) Perrin. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 40-42.

Experiments with glass-making molds for testing the advisability of Cr plating the molds. Results of experiments, and possibilities of commercial application. (L17, Cr, ST)

759-L. Applications of Hard Chromium in the Textile Industry. (In French.) Hanicot. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 43-47.

Experiences with Cr plating various parts of textile machinery. Results show the wide range of new applications of the process, which helps combat the wear of textile machinery. (L17, T29, Cr)

760-L. Some Applications of Hard Chromium in Engine Production. (In French.) De Vaulchier. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 48-55.

Plating of cylinders with porous Cr, and various applications in thin and thick Cr plating of tools. Results of experiments are outlined. (L17, T25, Cr, ST)

761-L. Apparatus for Hard Chromium Plating. (In French.) Loiseau. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 56-60.

Details of equipment and procedures. Two principal types of equipment and three principal types of plating are covered. (L17, Cr)

762-L. Review of Foreign Work on Hard Chromium. (In French.) Morisset. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 64-70.

27 references. (L17)

763-L. Advantages of Chromium Plating of Cutting Tools. (In French.) M. Martin. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 19-20.

The savings made possible. Refutes arguments against the procedure. (L17, T6, TS, Cr)

764-L. Recent Progress in the Chromium Plating of Gages. (In French.) Meynier. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 21-25.

Reports on recent tests on Cr plating of threaded plug gages. The profile of the plugs was studied before and after applying both thin and thick layers. Future possibilities. (L17, T7, Cr, ST)

765-L. The Effects of Chromium Plating on Cutting Tools. (In French.) P. Armagnat. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 26-31.

Experiments on the cutting phenomenon and the influence of the type of application of the tools on cutting conditions. (L17, T6, Cr, TS)

766-L. Present Research in France and Abroad on Hard Chromium. (In French.) Morisset. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 48-52.

A review. (L17, Cr)

767-L. Influence of Certain Organic Compounds on the Structure of Cathodic Lead Produced From Acetate Solution. (In Polish.) M. Perec. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 3, 1951, p. 217-231.

Conditions for adsorption of organic compounds on a polarized cathode. Effects of glue, gelation, diphemylamine, phenol, and B-naphthol on reduction of Pb^{++} in an acetate solution were studied polarographically. 14 ref. (L21, C23, Pb)

768-L. Action of Inhibitors in the Acid Pickling of Steel. Part III. Influence of Concentration of Acid on Effectiveness of Inhibition of the Solution of Iron and Nickel in Hydrochloric Acid in the Presence of Dibenzyl Sulfoxide. (In Polish.) M. Smialowski and Z. Ostrowski. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 3, 1951, p. 251-254.

Results of experiments are charted, tabulated, and discussed. (L12, ST)

769-L. Perhaps You Can Make Use of Evaporation Coating. Thomas A. Dickinson. *American Paper Converter,* v. 25, Nov. 1951, p. 10-11, 54, 56, 58.

Development on a commercial scale of the evaporation coating process, whereby metals or other materials are vaporized in a vacuum and deposited on paper or film. (L25)

770-L. A Study of Primers for Ferrous Metals in an Atmospheric Exposure. T. A. Dembski, R. Marotta, F. W. Alvarez, E. Berberian, S. A. Fine, R. L. Feffrey, H. Jerome, H. Kelfer, B. J. Mayo, F. S. McIllwaine, W. B. Pierce, S. White, B. Wilson, and E. Zarach. *American Paint Journal,* (Convention Daily), v. 36, Nov. 3, 1951, p. 28-29.

Results from a 5-year atmospheric exposure of 56 metal primers. Types of primer that will function best as a shop coat. (L26, ST)

771-L. Ceramic Coating for Steel. *Canadian Metals,* v. 14, Oct. 1951, p. 40.

A finish of the type known as "Stoneclad". Applications for the protection of mild steel. (L27, ST)

772-L. Enameling of Aluminum. C. R. Sigler. *Ceramic Age,* v. 58, Oct. 1951, p. 15-16, 20, 47.

A survey of the development and various procedures used. (L27, Al)

773-L. Cermetallic Finishing. Thomas A. Dickinson. *Ceramic Age,* v. 58, Oct. 1951, p. 21, 24.

Mixed ceramic and metal powder finishing and its application to both ferrous and nonferrous surfaces. (L27)

774-L. Strong Shows Toughness of New One Coat Enamel. *Ceramic Industry,* v. 57, Nov. 1951, p. 60.

Outlines paper by Paul S. Cecil of Strong Mfg. Co., Sebring, Ohio, who described the Ti-Loc pretreatment process for steel. This process permits direct application of the white coat. Acid resistance, reflectivity, resistance to thermal shock and abrasion, color stability and other properties are not sacrificed. (L27, ST)

775-L. How Kawneer Enamels Aluminum. C. R. Sigler. *Ceramic Industry,* v. 57, Nov. 1951, p. 61-62, 109, 111. (Based on E. I. Du Pont de Nemours & Co., Bulletin 31.)

A 6-step enameling process used to coat 61S Al with vitreous enamel, as modified by Kawneer Co., Niles, Mich. Steps are: metal pretreatment, milling the enamel, spraying, firing, testing and inspection, and rerolling. (L27, Al)

776-L. Bull's Eye and New Targets. *Chemical Week,* v. 69, Nov. 3, 1951, p. 37-38.

Developments in Fe, Zn, and Mn coatings. New fields of application. (L general, Fe, Zn, Mn)

777-L. Small Tubes Made by Electrodeposition. *Electronics,* v. 24, Nov. 1951, p. 216, 220. (Condensed from "Making Small Metal Tubes by Electrodeposition of Nylon Fibers", by R. J. E. Gezelius, *Review of Scientific Instruments,* v. 21, Oct. 1950, p. 886.)

Describes an innovation in the above—that is, use of a silvered nylon fiber as a mandrel. Procedure is outlined. (L)

778-L. Heat-Retardant Paints and Coatings. James J. Duggan. *Factory Management and Maintenance,* v. 109, Nov. 1951, p. 101-103.

Results of four series of tests covering steel structural members; steel pipe (empty and water-filled); steel shipping containers; steel-clad wooden doors; and flat steel plates. Results indicate that heat-retardant coatings should be considered for use on all types of structural steel fire-resistant and noncombustible construction. (L26, ST)

779-L. A New Process for One Coat White Direct to Steel. Paul L. Cecil. *Finish,* v. 8, Nov. 1951, p. 36-37.

Photographs of demonstration tests following the application of cover-coat porcelain enamels direct to steel. (L27, ST)

780-L. A Symposium on Conservation of Pickle Room Materials. Part I. Conservation of Cleaner. J. J. Baker. **Part II. Conservation of Sulphuric Acid and Nickel Sulphate.** M. H. Whitehead. **Part III. Conservation of Sodium Cyanide Neutralizers.** Lewis C. Farrow. *Finish,* v. 8, Nov. 1951, p. 38-40, 45, 73.

Procedures and techniques. (L12)

781-L. Ceramic Coatings for the "Hot Spots". Wilson G. Hubbell. *Finish,* v. 8, Nov. 1951, p. 33-34, 104, 106.

Background information and service test data. Tests conducted at Ryan Aeronautical Co. (L27)

782-L. Galvanizing in 1951. Nelson E. Cook. *Journal of the American Zinc Institute,* v. 29, 1951, p. 11-17.

Economic aspects. (L16, A4, Zn, ST)

783-L. Anode Polarization Effects of Nickel in Sulfuric Acid. Dennis R. Turner. *Journal of the Electrochemical Society,* v. 98, Nov. 1951, p. 434-442.

Study to determine the nature of the electrode reactions involved. Current densities below and above that required to passivate a nickel anode were used. There was evidence of an anodic film forming at the active nickel surface prior to the onset of passivity. The nickel oxide formed anodically was soluble in the acid solution and controlled the rate of polarization decay. 14 ref. (L17, Ni)

784-L. Electrodeposition Behavior of Traces of Silver. II. Effects of Electrode History and the Presence of Other Ions. III. Transition Region Between "Trace" and "Macro" Behavior. John T. Byrne, L. B. Rogers, and John C. Griess, Jr. *Journal of the Electro-*

chemical Society, v. 98, Nov. 1951, p. 447-456.

Part II: The behavior of amounts of silver deposited in less than a monolayer on an inert electrode was determined in the presence of several ions. Relatively large amounts of Cu (II), Pd (II), and Pt (IV) were without effect, but changes in the concentration of H ion produced a significant effect. Part III: By starting with a solution containing a "trace" of silver and making stepwise additions of known amounts of silver followed each time by a deposition curve, the behavior of intermediate amounts was elucidated. A series of curves was obtained for Pt, Pd, and Au electrodes in various media. 15 ref. (L17, Ag).

785-L. Critical Interpretation of Electrodeposition Studies Involving Traces of Elements. John T. Byrne and L. B. Rogers. *Journal of the Electrochemical Society,* v. 98, Nov. 1951, p. 457-463.

Shows that a large part of the electrode surface may contribute to undervoltage phenomenon and that a more satisfactory picture of the deposition process is obtained by abandoning the concept of discrete active centers and considering instead the relationship between the energy of deposition of the deposited element and its energy of sublimation. 22 ref. (L17)

786-L. Overpotential. J. O'M. Bockris. *Journal of the Electrochemical Society,* v. 98, Nov. 1951, p. 153C-157C.

Historical observations, factors hindering progress and theoretical aspects. Additional work required. (L17)

787-L. Nonporous Refractory Coatings Permit Use of Mild Steel for High Temperature Applications. *Journal of Metals,* v. 3, Nov. 1951, p. 980.

Use of "Stoneclad" process, recently developed by a British firm. It is also applicable to cast iron. (L27, CN, CI)

788-L. Vinyl-Resin Coatings in Petroleum Refineries. C. G. Munger. *Mechanical Engineering,* v. 73, Nov. 1951, p. 899-902.

Applications. Vinyl resins have the basic resistance and chemical properties required for resistance to refinery corrosion. (L26)

789-L. The Control of Bright Zinc Plating. F. J. Kolar, Jr. *Metal Finishing,* v. 49, Nov. 1951, p. 52-55.

Control of bright Zn baths by controlling the cyanide-zinc ratio. Role of brighteners in Zn baths. Analytical control of the sulfide purifier and statistical quality control for automatic plating operations are presented as new ideas for process control. (L17, Zn)

790-L. Problems of Plating Powder Metal Parts. J. D. Shaw, W. V. Knopp and C. L. Clark. *Metal Finishing,* v. 49, Nov. 1951, p. 56-58.

The nature of porous and dense products. Various methods of plating. References. (L17, H general)

791-L. The Use of Glycerine in Metal Finishing. E. Scott Pattison. *Metal Finishing,* v. 49, Nov. 1951, p. 62-64.

Use in electrolytic, chemical, and mechanical processes. Application to various types of metals. (L general)

792-L. Practical Barrel Finishing. Part III. Peter L. Veit. *Metal Finishing,* v. 49, Nov. 1951, p. 65-73, 76.

Various characteristics of individual metals and barrel cycles for each metal. (L10, Cu, Al, Fe, Zn, Pb, Ag, Au)

793-L. A New Finish for Magnesium Alloys. Harry A. Evangelides. *Organic Finishing,* v. 12, Oct. 1951, p. 17-22.

Previously abstracted from *Metal Finishing.* See item 720-L, 1951. (L13, R general, Mg)

794-L. Substitute Finishes for Electroplating. *Plating,* v. 38, Nov. 1951, p. 1153, 1156.

Discussion of five papers published in the Oct. issue. (L general)

795-L. Purification of Plating Solutions by Low Current Density Electrolysis. C. E. Naylor. *Plating Notes,* v. 3, June, 1951, p. 77-90.

A literature survey. Data on various treatments are tabulated. Includes notes on the effects of certain concentrations of various impurities which should be useful in assessing possible causes of defects in deposits. (L17)

796-L. Broader Use of Hot-Sprayed Lacquer Seen on Military Equipment. *Steel,* v. 129, Nov. 12, 1951, p. 76-79.

Types of units now available in the finishing industry. Advantages of hot spraying. (L26)

797-L. New Aluminum Polishing Compound. *Western Machinery and Steel World,* v. 42, Oct. 1951, p. 78, 103.

Compound developed by Ryan Aeronautical Co. is said to save metal by removing little of it during the process. Some indication of composition is given. (L10, Al)

798-L. Finishing Techniques Follow Assembly Line Pattern to Achieve High Standards. Howard E. Jackson. *Western Metals,* v. 9, Oct. 1951, p. 26-27.

Procedures followed at Westinghouse Electric Corp.'s Seattle, Wash., branch for finishing various metal parts. (L general)

799-L. Progress of Tin-Zinc Alloy Plating. *Wire Industry,* v. 18, Oct. 1951, p. 885.

Progress in commercial application of the process. (L17, Sn, Zn)

800-L. Pickling Accelerators. (In French.) G. Rossi-Landi. *Métallurgie et la Construction mécanique,* v. 83, Sept. 1951, p. 687, 689.

The nature of pickling and of the role of inhibitors and accelerators as applied to steel. Certain iron salts are suggested as accelerators. (L12, ST)

801-L. Pickling of Copper and Its Alloys by Ferric Sulfate. (In French.) Jean Bary. *Métallurgie et la Construction mécanique,* v. 83, Sept. 1951, p. 689.

Advantages of using ferric sulfate. Details of temperature and composition of the bath. (L12, Cu)

802-L. Advances in the Technique of Enameling With Special Emphasis on the Cast-Iron Enameling Industry. (In German.) H. J. Karmaus. *Giesserei,* v. 38 (new ser., v. 4), Aug. 23, 1951, p. 397-401.

Surveys journal and patent literature on cast irons suitable for enameling, methods of cleaning cast iron, new materials and processes for enameling, enameling furnaces, and test methods. 18 ref. (L27, CI)

803-L. Effect of Anode Shape on Uniformity of Nickel Electrodeposition. (In German.) D. Mojert. *Metall,* v. 5, Sept. 1951, p. 388-392.

Perforated and grid-type anodes produce a more uniform deposit of Ni than non-perforated anodes. However, the latter type is used to advantage in plating perforated sheet metal. Perforated anodes also reduce time of Ni plating. (L17, Ni)

804-L. Corrosion Resistance of Sprayed Austenitic Materials. (In German.) Otto van Rossum. *Metalloberfläche,* sec. A, v. 5, Aug. 1951, p. A113-A115.

Experiments in which austenitic Cr-Ni-Mo steel was sprayed onto a tube, then separated from the tube, and examined for its hardness, microstructure, and resistance to corrosion in different reagents. (L23, R general, SS)

805-L. Effect of Spraying Condition on the Grain Size of Sprayed Metal Coatings. (In German.) Paul Koch. *Metalloberfläche,* sec. A, v. 5, Sept. 1951, p. A129-A133.

Charted results of experiments indicate the need for continued experimentation, since the trend of results is too indefinite to permit the drawing of general conclusions. (L23)

806-L. Coatings for Fixed Steel Parts Submerged in Water. (In German.) *Metalloberfläche,* sec. A, v. 5, Sept. 1951, p. A143.

Results of a series of experiments on rust-inhibiting coatings show the superiority of a hot mixture of bituminous coal-tar pitch and microasbestos. Rust-inhibiting properties of other types of coatings. (L26, ST)

807-L. Copper Deposits From Hot Potassium Cyanide Baths. (In German.) Richard Erdmann. *Metalloberfläche,* sec. B, v. 3, Aug. 1951, p. B118-B119.

Thickness of Cu deposits can be increased by adding NaK tartrate to the bath. (L17, Cu)

808-L. Effect of Blinding on the Cathodic Dispersion of Metal in Galvanic Baths. (In German.) J. Steiner and K. Schery. *Metalloberfläche,* sec. B, v. 3, Sept. 1951, p. B129-B132.

Refers to partial blocking of the holes in screens around the cathodes. Experiments show that metal dispersion can be considerably controlled by type of screen, size of screen hole, and distance of the screen from the cathode. Optimum cathode arrangement greatly reduces effect of electrolyte composition. (L16)

809-L. Effect of Aluminum as an Alloying Element in Refined-Zinc Baths on the Quality of High-Carbon Hot-Galvanized Steel Wires. Heinz Gallbach and Anton Pomp. *Stahl und Eisen,* v. 71, Aug. 2, 1951, p. 805-816; disc., p. 816-817.

Experiments made to determine effect of carbon content of steel, area reduction, heat treatment, time of galvanizing, and Al content of the bath on quality of galvanized steel. Results show that Al has an undesirable effect on the bending strength of the wires. (L16, ST, Al, Zn)

810-L. Effect of Ultrasonics on Electrolytic Processes. III. Effect of Frequency on the Stirring Action of Ultrasonics. (In German.) Albert Roll and Gerhard Schrag. *Zeitschrift für Metallkunde,* v. 42, July 1951, p. 197-201.

To test the assumption that effect of ultrasonics depends on intensity rather than on frequency, experiments were made at 560,000; 34,000; 15,000; and 100 c.p.s. on deposition potentials of Ni. Results show a decreasing stirring effect with increasing frequency. (L17, C23, Ni)

811-L. Effect of Ultrasonics on Electrolytic Processes. IV. Effect of Ultrasonics on Bright Nickel Plating. (In German.) Albert Roll. *Zeitschrift für Metallkunde,* v. 42, Aug. 1951, p. 238-243.

The application of ultrasonic frequencies (34,000 c.p.s.) increases the required current density from 2.7 to 40 ma. per sq. cm. Motion of the metal ions in the ultrasonic field

was studied. Photographs show effects of ultrasonics on Ni electrodeposits. (L17, Ni)

812-L. Effect of Ultrasonics on Electrolytic Processes. V. The Effect of Ultrasonics on the Properties of Electrodeposited Metals. (In German.) Albert Roll. *Zeitschrift für Metallkunde*, v. 42, Sept. 1951, p. 271-273.

Effect of ultrasonics on surface condition, crystal structure, and microhardness of the metal deposits. The vibrations have no effect unless the frequency is high enough to cause formation of standing waves. Work was done on Ag and Ni deposits. High intensity may damage the surface. 10 ref. (L17)

813-L. Ceramics and Special Alloys: A Metallurgical Investigation at Elevated Temperatures. Wilson G. Hubbell. *Aeronautical Engineering Review*, v. 10, Nov. 1951, p. 24-30.

See abstract of "Ceramic Coatings for the Hot Spots", *Finish*, item 781-L, 1951. (L27)

814-L. The Rate of Pickling Test for Tin-Plate Steels and Its Metallurgical Significance. E. L. Koehler *American Society for Metals*, Preprint 7W, 1951, 15 pages.

"Pickle lag", determined by the rate of pickling test, is a phenomenon in tinplate steels which is associated with poor internal corrosion resistance of tin cans. It is traced to the occurrence of grain-boundary oxides in the surface layers of the steel. These are developed during box annealing in an atmosphere which is not oxidizing to ferrite grains, but is oxidizing to the grain boundaries. Improved, rapid test for pickle lag. (L17, R11, CN)

815-L. Tests Prove Value of Ceramic Coatings. Wilson G. Hubbell. *Automotive Industries*, v. 105, Nov. 1, 1951, p. 48-50, 114, 116.

Study discloses the intimate metallurgical changes which occur in ceramic-coated exhaust manifolds at elevated temperatures. By the means of photomicrographs, spectograms, and microhardness readings, significant advantages which ceramic coatings provide are proven. No deterioration by oxidation, carbon absorption, or corrosion attack was found in ceramic-protected exhaust headers tested in actual flight for periods up to 1623 hr. (L27, SG-h)

816-L. Deburring Precision Parts by Wet Tumbling Method. Herbert Chase. *Automotive Industries*, v. 105, Nov. 1, 1951, p. 51-53, 83, 86. **Gears and Stampings De-Burred by Wet Tumble Grinding.** Herbert Chase. *Magazine of Tooling and Production*, v. 17, Nov. 1951, p. 48-49, 88, 90, 92.

Roto-Finish procedure, equipment, and applications. (L10)

817-L. A Corrosion-Inhibitive Coating for Buried Lead-Covered Cables. Wiley D. Sanderson. *Corrosion* (News Section) v. 7, Nov. 1951, p. 1-2.

Use of clay-base asphalt emulsion. Diagrams show method of installation. (L26, Pb)

818-L. Technical Development in Germany. I. J. I. Cordwell. *Industrial Gas* (London), v. 24, Sept. 15, 1951, p. 6-9; Oct. 20, 1951, p. 6-8. (Supplements to *Gas World*, v. 134.)

Reviews a recent work of A. Duphorn from *Stahl und Eisen*, v. 70, No. 15, on design, development, and operational results of gas-fired wire heating and galvanizing furnaces in Germany. (L16, J general, Zn, CN)

819-L. Dragout Control. Part I. Joseph B. Kushner. *Metal Finishing*, v. 49, Nov. 1951, p. 59-61, 64.

Dragout is defined as the volume of solution carried over the edge of a plating or dip tank by an emerging piece of work. Theory in the control and reduction of dragout losses from plating solutions. (To be continued.) (L17)

820-L. The Protection of Metallic Surfaces by Chromium Diffusion. Part III. Structure of Chromised Coatings. R. L. Samuel and N. A. Lockington. *Metal Treatment and Drop Forging*, v. 18, Oct. 1951, p. 440-444.

Temperature of the treatment is shown to be important in its effect on grain size of the coating and the core. Effect of carbon and other alloying elements on the final structure. Covers both mild and alloy steels. (To be continued.) (L15, Cr, ST)

821-L. Cleaning and Preparation of Metals for Electroplating. I. Degreasing Evaluation Tests: Sequential Testing. Henry B. Linford and Edw. B. Saubestre. *Plating*, v. 38, Nov. 1951, p. 1157-1161.

The relative sensitivity of various degreasing-evaluation tests is determined by means of "sequential testing". In this type of testing, a panel is consecutively examined by means of a series of tests. Compares performance of various degreasing-evaluation tests and obtains a measure of their relative sensitivities. (To be continued.) (L12)

822-L. Surface Treatment of Aluminum and Its Alloys (Continued.) (In French and German.) B. Mauderli. *Aluminium Suisse*, Sept. 1951, p. 180-190.

Electrolytic oxidation and electrodeposition of metallic coatings. Effects of faulty treatment. (To be continued.) (L17, L14, Al)

823-L. New Information on Surface Protection of Heat Resistant Structural Materials. (In German.) Arno Staerker, *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 28, Aug. 1951, p. 390-395.

Corrosion resistance of steels, carbides, and other metals coated with Vanal (a ceramic composition containing Al and V) is greatly improved as the result of reduced surface tension. Includes test-specimen photographs and tabular data. (L27, ST)

824-L. (Book) **Galvanotechnik.** (Electroplating.) Ed. 9. Vols. I and II. R. Bilfinger, G. Elssner, A. Gabler-Gumbert, K. Gürtelmeier, F. Fox, E. Krause, O. Müller, R. Radenhausen, R. Springer, M. Völcker, and H. Weissensee. 1716 pages. 1949. Akademische Verlagsgesellschaft Geest & Portig, K. G. Leipzig, Germany.

This handbook, formerly known under the name Pfanhauser, deals comprehensively with theory and practice of electroplating (including deposition of metals and non-metals). (L17)

825-L. (Book) **Galvanotecnica.** (Electrodeposition Technology.) Ed. 2. Eugenio Bertorelle. 762 pages. 1951. Urico Hoepli, Milan, Italy.

Theoretical basis, general technique, and practice of electroplating, galvanoplastics, anodic oxidation of Al. Electrochemical processes and the specialized chemistry involved in the field. 29 ref. (L17, L18, C23)

SECTION M

METALLOGRAPHY, CONSTITUTION and PRIMARY STRUCTURES

1-M. Grand Prize, 1950 Metallographic Exhibit. *Metal Progress,* v. 58, Dec. 1950, p. 842.

Micrograph showing veining in ferrite. Prepared by Sten O. Modin, Metallografiska Institutet, Stockholm, Sweden. (M27, ST)

2-M. Heat Treatment and Structure of Commercial Titanium. Joseph Maltz and Vincent DePierre. *Metal Progress,* v. 58, Dec. 1950, p. 862-866.

Metallographic procedures and effects of various heat treatment schedules on microstructure. (M27, J general, Ti)

3-M. An X-Ray Method for the Study of Phase Changes at High Temperatures. H. T. Heal, and H. Mykura. *Metal Treatment and Drop Forging,* y. 17, Autumn 1950, p. 129-135.

A method of studying phase transformations in solids by continuously measuring the intensity of X-rays diffracted from one set of crystal planes. A bent-crystal monochromator, Seemann-Bohlin focusing, and a Geiger counter as detector are used. An S-curve for a 2½% Ni steel, determined by this method, shows fair agreement with curves for the same steel obtained by standard microscopic technique during continuous cooling and in the martensite region, where other methods become difficult. (M22, N8, AY)

4-M. Experimental Study of Structural Rearrangements Caused by Heat Treatment of Some Complex Binary Ferronickels. (In French.) E. Josso. *Revue de Métallurgie,* v. 47, Oct. 1950, p. 769-777; disc., p. 778.

Results of a dilatometric study of three ferronickels having compositions fairly close to that of Ni_3Fe. Influence of temperature of annealing and of Ni content on thermal-expansion characteristics were determined. Volumetric anomalies resulting from structural rearrangements were determined more exactly than heretofore. 16 ref. (M23, P10, Fe, Ni)

5-M. Structure, Hardness, and Workability of Iron-Carbon-Silicon Alloys. (In German.) R. Mitsche and W. Schreiber. *Neue Giesserei,* v. 37 (new ser., v. 3), Nov. 2, 1950, p. 485-488; disc., p. 488.

The alloy cast irons investigated contained 3.64-2.80% C, 4.53-9.9% Si, up to 2.26% Mn, and relatively high P and S contents. Experiments showed that all of them can be readily machined and drilled. 13 ref. (M27, Q29, G17, CI)

6-M. Properties of Continuously Cast Refined Steels. (In German.) Helmut Krainer and Bruno Tarmann. *Stahl und Eisen,* v. 70, Nov. 23, 1950, p. 1098-1106; disc. 1106-1108.

Study of the structures and mechanical properties of 19 steels in the as-cast state as well as after forging or rolling. Carbide dispersion in ledeburitic toolsteels was also investigated, and it was found that the reticular structure of ledeburite is somewhat finer in continuously cast steel than in ingot steel. Includes graphs, tables, micrographs, and macrographs. (M27, Q general, CI, TS)

7-M. Concerning a Eutectic Grain. (In Russian.) Ya. V. Grechnyi. *Doklady Akademii Nauk SSSR,* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 11, 1950, p. 933-934.

One of the phases of the fayalite-wustite eutectic in synthetic alloys of FeO with SiO_2 and in iron-ore agglomerates, is shown to be present in monocrystalline form. (M27, Fe)

8-M. Crystal Structures of the α-Phase of the System Al-Mg and of the α-Phase of the System Tl-Bi. (In Russian.) E. S. Makarov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR),

new ser., v. 74, Oct. 11, 1950, p. 935-938.

Results of X-ray investigation of the above intermetallic phases. (M26, Al, Mg, Tl, Bi)

9-M. The Structure of Martensite Electrolytically Separated From Tempered Steel. (In Russian.) M. P. Arbuzov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 21, 1950, 1085-1087.

Investigated for tempered carbon steel containing 0.80, 0.98, 1.16, 1.38, and 1.51% C, using an electrolytic method for carbide-phase separation developed by the author. Structure was determined by X-ray methods. It was found that, during this separation, the structure of the martensite does not change. (M26, ST)

10-M. The Crystal Structure of a Sigma Phase, FeCr. David P. Shoemaker and Bror Gunnar Bergman. *Journal of the American Chemical Society,* v. 72, Dec. 1950, p. 5793.

Results of work on 2 single crystals of FeCr sigma phase, about 0.1 mm. in diam., which the authors succeeded in isolating. (M26, Fe, Cr)

11-M. Accurate Determination of the Lattice of Beta-Titanium at 900° C. Daniel S. Eppelsheimer and Robert R. Penman. *Nature,* v. 166, Dec. 2, 1950, p. 960.

Procedure and data claimed to be highly accurate. (M26, Ti)

12-M. Microhardness of the Cu-Al Solid Solution in 90-10 Aluminum Bronze. (In Italian.) A. Gragnani. *Alluminio,* v. 19, No. 5, 1950, p. 403-410.

The constitution diagram was investigated by means of microhardness determinations with emphasis on the Cu-Al solid solution. Data demonstrate the possibility of existence of two different alpha phases, one of which is located on the boundary between the α and $\alpha+\beta$ phases. 11 ref. (M24, Cu, Al)

13-M. Abnormal Steel and Its Structure. (In English.) Keizo Iwasé and Masao Homma. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Aug. 1949, p. 95-100.

Refers to anomalous structures found in the hypereutectoid zones of some carburized steels. Nature of the "abnormality" and theories of its formation. Experiments on influence of alloying elements and on mechanism of formation. Phase changes occurring during such formation. 29 ref. (M27, N3, AY)

14-M. Metallographic Study of the Martensite Transformation in Lithium. J. S. Bowles. *Journal of Metals,* v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 44-46.

Techniques developed for the metallographic examination of Li. The microstructural characteristics of Li martensite are described and illustrated. 11 ref. (M27, N9, Li)

15-M. Atomic Relationships in the Cubic Twinned State. W. C. Ellis and R. G. Treuting. *Journal of Metals,* v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 53-55.

Shows that the twinned state is characterized by a lattice of coincidence sites. Imperfections are required at stable lateral-twin interfaces. Twinned regions can occur with relative ease in the diamond cubic structure. (M26)

16-M. Transitions in Chromium. M. E. Fine, E. S. Greiner, and W. C. Ellis. *Journal of Metals,* v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 56-58.

Discontinuous changes of Young's modulus, internal friction, coefficient of expansion, electrical resistivity, and thermoelectric power are described as evidence for a transition in chromium near 37° C. Although the X-ray diffraction pattern gives no clue, a difference between thermal expansivity and temperature dependence of lattice parameter suggests a crystallographic change. Young's modulus data disclosed another transition near −152° C. 14 ref.
(M26, P10, P11, P15, Q21, Cr)

17-M. Crystallographic Angles for Magnesium, Zinc and Cadmium. Edward I. Salkovitz. *Journal of Metals,* v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 64.

Tabulation of angles between crystallographic planes in close-packed hexagonal crystals of Mg, Zn, and Cd. (M26, Mg, Zn, Cd)

18-M. A Low-Temperature Microscope Stage. R. G. Rhodes. *Journal of Scientific Instruments,* v. 27, Dec. 1950, p. 333-334.

A simple cold chamber for optical observation of crystals below room temperature, under conditions relatively free from frosting. It is designed for the polarizing microscope with objective up to 20X. The low temperatures can be regulated to within ±0.1° C. down to −140° C. by manual control of the heating elements. (M21)

19-M. Apparatus for the Study by Electron Diffraction of the Effect of Temperature on Surface Films. J. W. Menter and J. V. Sanders. *Journal of Scientific Instruments,* v. 27, Dec. 1950, p. 335-336.

Specimen holders for heating "reflection" and "transmission" specimens for examination by electron diffraction. The temperature of the specimens may be measured to within a few degrees in the range 15-200° C. A film holder with which it is possible to make up to 20 exposures without breaking the vacuum of the diffraction camera. (M22)

20-M. Focusing in Electron Microscopy. R. S. M. Revell and A. W. Agar. *Journal of Scientific Instruments,* v. 27, Dec. 1950, p. 337.

Series of micrographs of a metal grain illustrate the importance of accurate focusing to avoid misinterpretation. (M21)

21-M. The Setting of Single Crystals from Zero Layer Curve Photographs. P. T. Davies. *Journal of Scientific Instruments,* v. 27, Dec. 1950, p. 338.

Procedure enables rapid setting to be made by X-rays of crystals which have already been set approximately by optical means. It is based on the method given by Weisz and Cole, but less calculation is required. (M21)

22-M. (Book) **Electron Microstructure of Steel.** 49 pages. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $1.35.

Presents 47 carefully prepared electron micrographs of various steel constituents, printed on special paper. Illustrates effects of variations in metallographic polishing and etching practices, replica techniques, and photographic procedures. Both mechanical polishing and electropolishing were used to some extent. (M21, ST)

23-M. (Book) **X-Rays.** Ed. 3. B. L. Worsnop and F. C. Chalklin. 126 pages. 1950. John Wiley & Sons, 601 W. 25th St., New York 1, N. Y.

A monograph presenting the modern position of X-rays. Covers: determination of wave-length and X-ray spectroscopy; X-ray spectra; the scattering of X-rays; optical phenomena; and photo-electrons and ionization. 28 ref. (M21, M22, S11, S13)

24-M. (Book) **Alloy Systems.** J. O. Lord. 380 pages. Sir Isaac Pitman & Sons, Ltd., Pitman House, Parker St., London W. C. 2, England. 40s.

British edition. See item 4A-68, 1949. (M24, N general)

25-M. X-Rav Diffraction Methods as Applied to Powders and Metals. William L. Davidson, "Physical Methods in Chemical Analysis" Vol. I. Academic Press Inc., New York, 1950, p. 17-105.

Techniques, elements of crystal structure, formulas for interplanar spacing, and use of techniques for chemical analysis, crystal system identification, crystallite and particle-size determination, study of precipitation hardening and constitution diagrams, stress measurement, etc. 121 ref. (M22, S11)

26-M. Electron Diffraction. L. O. Brockway. "Physical Methods in Chemical Analysis", Vol. I, Academic Press Inc., New York, 1950, p. 167-191.

Interpretation of patterns. Technique and applications. 57 ref. (M22, S11)

27-M. Electron Microscopy. Robert D. Heidenreich. "Physical Methods in Chemical Analysis", Vol. I, Academic Press Inc., New York, 1950, p. 535-586.

Imaging, types of instruments, magnification calibration, stereoscopy, and application to colloidal systems and solid surfaces. 63 ref. (M21, S11)

28-M. Gallium Anisotropy and Crystal Structure. R. W. Powell. *Nature,* v. 166, Dec. 30, 1950, p. 1110-1111.

Relationship of electrical conductivity to lattice orientation. (M26, P15, Ga)

29-M. An Experimental and Thermodynamic Investigation of the Hydrogen-Titanium System. A. D. McQuillan. *Proceedings of the Royal Society,* ser. A, v. 204, Dec. 22, 1950, p. 309-323.

Temperature - pressure - concentration relationships of the system were studied, and its more important thermodynamic aspects considered. Part of the equilibrium diagram was established, and free-energy curves for the α- and β-solutions are plotted for a number of temperatures. Results were used to obtain values for the latent heat of the $\alpha \rightleftarrows \beta$ transformation and the transformation temperature. (M24, N6, P12, Ti)

30-M. A New Mechanically Recording Dilatometer for Physical-Thermal Analysis of Materials and for Measurement of Their Expansion, Blus Apparatus for the Study of Isothermal Annealing. (In French.) Pierre Chevenard. *Revue de Métallurgie,* v. 47, Nov. 1950, p. 805-816.

Complete details, including a number of schematic diagrams. Technique of use and results of a typical determination. (M23, P11)

31-M. New Phases of the MnP (B31) Type. (In German.) *Zeitschrift für Metallkunde,* v. 41, Oct. 1950, p. 358-367.

Preparation of the following alloy compositions: AuGa, PdSi, PtSi, NiGe, PdGe, IrGe, PtGe, RhSb, MnSb, IrPb, and RhBi. Their powder patterns indicate that they possess definite phases corresponding to these compositions. 26 ref. (M26, EG-a)

32-M. A Contribution to Knowledge Concerning the Temperature Hysteresis of Several Properties of α Copper Solid Solutions. (In German.) Konrad Schubert and Rudolf Jaggi. *Zeitschrift für Metallkunde,* v. 41, Oct. 1950, p. 367-369.

Precise determinations on a commercial Cu-Mn-Al alloy (83% Cu, 12.1% Mn, 3.5% Al) show that the lattice constants of the α-phase are dependent on its previous treatment. These constants are related to dilatometric measurements and to changes in electrical resistance. (M26, M23, P15, Cu)

33-M. Crystallographic Indices of Cut Grain Areas in Polished Metals. (In German.) Hans Kostron. *Zeitschrift für Metallkunde,* v. 41, Oct. 1950, p. 370-377.

Methods for establishing orientation of the grains of a metallographic sample and for calculating angle of the cut plane to the crystal axes. With the aid of eight graphs, which comprise all possible positions of the polished plane, one can determine any index, provided at least three angles are definitely known. Diagrams, photomicrographs, tables, and graphs illustrate results obtained by other investigators for Al-Cu-Mg alloys. 14 ref. (M27, M26)

34-M. Diffusion Scattering of X-Rays by Plastically Deformed Aluminum Single Crystals. (In Russian.) E. V. Kolontsova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Nov. 11, 1950, p. 189-192.

Studied for slightly and highly deformed Al single crystals. Method of study, including special apparatus which permits investigation at temperatures as low as 82-83° K. Results indicate that a photographic method for recording the diffusion scattering is sensitive enough for study of the initial stages of plastic deformation of single crystals. (M23, Q24, Al)

35-M. Crystal Structure of the Ternary System CuMgSn. (In Russian.) P. I. Kripyakevich, E. I. Gladyshevskii, and E. E. Cherkashin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Nov. 11, 1950, p. 205-207.

Investigated for compositions of 33.3% Sn, 7-40% Cu, and 33-60% Mg. (M26, M24, Cu, Mg, Sn)

36-M. Formation and Behavior of Subboundaries in Silicon Iron Crystals. C. G. Dunn and F. W. Daniels. *Journal of Metals,* v. 191, Feb. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 147-154.

Single crystals of Si iron were plastically deformed by either cold rolling or bending and subsequently annealed. Results of micrographic and X-ray investigation are presented and discussed. Includes Laue patterns and photomicrographs. 16 ref. (M26, Q24, Fe)

37-M. Examination of Metals Under Polarized Light. I. Theory and Apparatus. B. W. Mott and H. R. Haines. *Research,* v. 4, Jan. 1951, p. 24-33.

A review. 70 ref. (M21)

38-M. The Structure of Hardmetals. Paul Schwarzkopf. *Powder Metallurgy Bulletin,* v. 5, Dec. 1950, p. 68-79.

Need for intensification of research in the field of cemented carbides and other hard metals, (substances having structural characteristics similar to the refractory carbides). This is especially imperative because of lack of W and Co in the U. S. Both development of high-temperature materials on a hard-metal basis as well as development of W-free (and preferably also Co-free) tool materials, appears to require a better understanding of the structure of hard metals. Crystal structure, size factor, and Hagg's rule. Lattice-dimension data for a large number of carbide and nitride interstitial phases. 28 ref. (M26, C-n, SG-h,j)

39-M. Electron Microscopy. F. A. Hamm. *Analytical Chemistry,* v. 23, Jan. 1951, p. 17-20.

A review. 61 ref. (M21)

40-M. The Solubility Relationships in the Aluminium-Sodium and Aluminium-Silicon-Sodium Systems. C. E. Ransley and H. Neufeld. *Journal of the Institute of Metals,* v. 78, Sept. 1950, p. 25-46.

Solid solubility of Na in Al was determined by direct measurement of the amount dissolved when high-purity Al is immersed in liquid Na. The data allow calculation of the rate of diffusion of Na in solid Al. The liquid-miscibility boundary in the binary system was also redetermined. When Al containing Si in solid solution is heated in liquid

Na, a ternary compound is formed as a surface layer or sub-scale. By means of experiments it was possible to derive approximate values for concentration of Si and Na in solid solution in equilibrium with this compound at various temperatures. A tentative diagram for the Al-Si-Na system is presented. 11 ref. (M24, N1, Al)

41-M. The Surface Condition of Polished Aluminium With a Note on the Effect of Surface Scratches. E. A. Owen and Y. H. Liu. *Journal of the Institute of Metals,* v. 78, Sept. 1950, p. 93-104.

The effect of polishing the surface of pure Al with different materials, including wash leather, emery paper, Al, Cu, and Zn was investigated by X-ray diffraction. In all cases the surface assumes the metastable state, in which lattice parameter is greater than it is in fully annealed material, so that crystallites in the polished layer are in a state of strain. The stresses remain until removed by suitable heat treatment. The amount of room-temperature recrystallization that occur after polishing varies with the different polishing materials, and effectiveness as polishers changes with nature of the material. Effect of a single surface scratch on Al was found to extend at least 1 mm. from the scratch. (M26, L10, Al)

42-M. Structure of Thin Films of Allphatic Esters and Alcohols on Metals. J. V. Sanders and D. Tabor. *Proceedings of the Royal Society,* ser. A, v. 240, Jan. 9, 1951, p. 525-533.

An electron-diffraction study of structure and orientation of the above thin films. Effect of temperature was examined by transmission and reflection methods. Bearing of the results on nature of the disorientation process, compared with boundary-lubricating properties of the substances. 18 ref. (M26, R2)

43-M. Orientation of Fatty Acid and Soap Films on Metal Surfaces. J. W. Menter and D. Tabor. *Proceedings of the Royal Society,* ser. A, v. 204, Jan. 9, 1951, p. 514-524.

An electron-diffraction study of structure and orientation. Effect of temperature on orientation, using the reflection method and an improved experimental technique. On non-reactive metals such as Pt, the disorientation temperature is close to the bulk melting-point of the fatty acid. On reactive metals such as Zn and Cd, disorientation occurs at a higher temperature, close to the bulk melting point of the corresponding metallic soap. Observations are compared with the lubricating properties of fatty acids and soaps on metal surfaces. 32 ref. (M26, R2)

44-M. The Further Development of Metallographic Methods for Measurement of Grain Sizes. (In German.) Cord Petersen. *Metall,* v. 5, Jan. 1951, p. 8-13.

Presently known method and a proposed method of determining grain-size distribution on the basis of physically or mathematically established standards. Graphs, diagrams, and photomicrographs. 20 ref. (M27)

45-M. On the Nature of Preston-Guinier Atom-Groups in an Age-Hardened Aluminium-Copper Alloy. Part I. Experimental. Part II. Theoretical. (In English.) Taira Suzuki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Oct. 1949, p. 183-192.

Results of work done an Al alloy containing 4.31% Cu, 0.29% Si, and 0.14% Fe. (M25, Cu)

46-M. New Sigma-Phases in Binary Alloys of the Transition Elements of the First Long Period. W. B. Pearson, J. W. Christian, and W. Hume-Rothery. *Nature,* v. 167, Jan. 20, 1951, p. 110.

Recent work which has led to discovery of four new σ-phases: Cr-Mn, V-Mn, V-Co, and V-Ni. Structural features are described. 10 ref. (M26, Cr, Ni, Mn, Co, V)

47-M. Intermetallic Compounds in Ternary Aluminium-Rich Alloys Containing Transitional Metals. J. N. Pratt and G. V. Raynor. *Proceedings of the Royal Society,* ser. A, v. 205, Jan. 22, 1951, 103-118.

Consideration of the Brillouin zone structures of Co_2Al_9, Co_2Al_5, and $NiAl_3$ suggests that the numbers of electrons accepted per atom are greater than the band theory would indicate, and are more nearly equal to the vacancies in the "atomic orbitals" postulated in the Pauling theory of transitional metals. Further information with regard to alloying characteristics of transitional metals was obtained by investigating ternary alloys of Al and Si with Cr, Mn, Fe, Co and Ni. 14 ref. (M25, M26, Al)

48-M. Local Distribution of Inclusions in Steel; Repercussions Arising From Confidence in Results of Their Enumeration. (In French.) A. Palazzi. *Revue de Métallurgie,* v. 47, Dec. 1950, p. 907-929.

Investigation indicates that the total number of inclusions in a specimen follows Poisson's law. Deviations from the Poisson distribution are the result of accidents. Devel-

ops an inclusion index valid for each steel melt. Very high indexes are associated with low values of mechanical properties. 12 ref. (M28, Q general, ST)

49-M. Solid Solutions of Nickel. (In Russian.) I. I. Kornilov. *Izvestiya Akademii Nauk* (Bulletin of the Academy of Sciences of the USSR), Section of Chemical Sciences, Nov.-Dec. 1950, p. 582-589.

Classifies types and number of possible ternary and quaternary solid solutions of nickel. Formation of complex saturated and unsaturated solid solutions of nickel with elements of the 4th periodic group was investigated. (M27, Ni, Ni)

50-M. Natural Width of a Grain Boundary in a Metal. J. L. Snoek. *Journal of Applied Physics,* v. 22, Jan. 1951, p. 109.

Natural width is defined as the width observed in the complete absence of internal strains and of impurities. This width may be expected to be a function of the relative orientation of the adjacent crystals only. Problems involved in determining this width. (M27)

51-M. A Simple Camera for Taking X-Ray Powder Patterns at Elevated or Reduced Temperatures. L. F. Connell, Jr., and H. C. Martin, Jr. *American Journal of Physics,* v. 19, Feb. 1951, p. 127-128.

(M23)

52-M. Relation of Structure of Stainless Steel to Hot Ductility. F. K. Bloom, W. C. Clarke, Jr., and P. A. Jennings. *Metal Progress,* v. 59, Feb. 1951, p. 250-256.

The hot-twist test first described by Sauveur and reported on in more detail by Ihrig and by Clark and Russ was used to investigate above relation for the various types of stainless steel. Photomicrographs illustrate structures of the different alloys following different heat treatments. 10 ref. (M27, Q23, SS)

53-M. New Uses of X-Rays and of Electron Diffraction. J. J. Trillat. *Transactions of the New York Academy of Sciences,* ser. 2, v. 13, Dec. 1950, p. 52-59.

Some new methods developed at the X-Ray Laboratory of the National Center of Scientific Research, Bellevue, France. These are divided into three classes: methods involving use of photo-electrons (electron radiography); methods involving diffraction of X-rays (study of surface structure); and methods involving diffraction of electrons (study of fresh metallic surfaces and their properties.) (M22, M23)

54-M. Fine Structure of Metals and Alloys. U. Dehlinger and H. Nowotny. "The American FIAT Review of German Science. Vol. 31. General Metallurgy," 1950, p. 1-55.

Reviews the chemical physics of alloys, including a section on the kinetics of allotropic transformations. Crystal structure of intermetallic phases. 195 ref. (M26, N6)

55-M. Microscopic and Roentgenographic Testing. A. Schrader, H. Mahl, W. Hofmann, and H. Neerfield. "The American FIAT Review of German Science. Vol. 31. General Metallurgy," 1950, p. 195-231.

Production of microsections and etchings, electron microscopy, structure determination by X-rays, and X-ray measurements of elastic stresses. 132 ref. (M21, Q25)

56-M. Examination of Metals Under Polarized Light. II. Applications. B. W. Mott and H. R. Haines. *Research,* v. 4, Feb. 1951, p. 63-73.

83 references. (M21)

57-M. A Sheet Specimen Scanner for X-Ray Diffraction. D. J. Neil. *Canadian Journal of Technology,* v. 29, Feb. 1951, p. 84-86.

An improved and simple design. Simultaneous back-reflection and transmission photographs at distances of 3 and 5 cm. respectively and any glancing angle from 0° to 90° are possible. Useful exposures can be obtained with times as low as 10 min. (M22)

58-M. Discussion on "The Nature and Uses of Diffraction," A. E. W. Austen and N. Hendry; "The Influence of Surface Behaviour on the Characteristics of Electrodeposits," A. T. Steer. *Journal of the Electrodepositors' Technical Society,* v. 25, 1950, p. 147-161. (Preprint.)

Joint discussion and authors' replies. (M22, L17)

59-M. Sigma-Phase in the Co-Cr and Fe-Cr Systems. G. J. Dickins, Audrey M. B. Douglas, and W. H. Taylor. *Journal of the Iron and Steel Institute,* v. 167, Jan. 1951, p. 27.

Several Fe-Cr alloys of compositions near 50 atomic % Cr were studied. A powder pattern characteristic of the σ-phase was identified. Compares results with those of other investigators. (M26, Co, Cr, Fe)

60-M. Structure of the Sigma-Phase in the Iron-Chromium and Cobalt-Chromium Systems. G. J. Dickins, Audrey M. B. Douglas, and W. H. Taylor. *Nature,* v. 167, Feb. 3, 1951, p. 192.

See preceding abstract under similar title from *Journal of the Iron and Steel Institute.* (M26, Fe, Cr, Co)

61-M. Single-Crystal Neutron Diffraction Analysis. R. D. Lowde. *Nature,* v. 167, Feb. 10, 1951, p. 243-244.

Technique which permits use of a small single crystal in conjunction with a pile of only moderate neutron flux. It has several advantages over prevailing methods. (M22)

62-M. Electrolytic Oxidation and Polishing of Titanium and Their Application in Investigation of Microstructures. (In French.) Pierre A. Jacquet. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Jan. 3, 1951, p. 71-73.

Method for rapid electropolishing of Ti and its alloys which makes it possible to obtain a truer picture of their microstructures. The polished surface may be etched by standard etching acids. Also, anodic oxidation produces an oxide film, the color of which depends on the crystal structure of the base metal. (M21, Ti)

63-M. Correlation Between Jernkontoret Fracture Number and JKM Grain Size of Hardened Steels. (In Swedish.) B. D. Enlund. *Jernkontorets Annaler,* v. 134, No. 11, 1950, p. 545-552.

In hardened steels of high carbon content, it is very difficult to develop the austenitic grain boundaries by etching. On Jernkontoret fracture-test pieces, very lightly ground on one side, it was possible to see the grain boundaries after etching on account of a slight surface decarburization. A very good linear correlation was obtained between JKM grain size determined in this way and Jernkontoret fracture number. Grain-size determinations on samples etched by means of the Bain-Vilella method did not give satisfactory correlation. (M27, CN)

64-M. Fracture Number, Austenitic Grain Size and Martensitic Structure. (In Swedish.) B. D. Enlund. *Jernkontorets Annaler,* v. 134, No. 11, 1950, p. 553-555.

A carbon steel containing 0.77% C was quenched from 1000° C. at different cooling rates in order to produce variation in the martensitic structure. The fracture as determined by means of the Jernkontoret standard fracture test was not influenced by variation in treatment but remained constant. The fracture therefore seems to depend on the austenitic grain size and to be independent of quenched structure, at least for coarse grains. (M27, CN)

65-M. Note on Silicon Distribution Between Austenite and Liquid Metal in Freezing Hypo-Eutectic Cast Iron. (In Swedish.) *Jernkontorets Annaler,* v. 134, No. 11, 1950, p. 556-558.

It was found that during freezing, the Si content of the mother liquor of a hypo-eutectic cast iron gradually decreases and the phosphorus content increases. This is a qualitative confirmation of Si distribution between austenite and liquid metal as shown in the Jass diagram of 1935. (M24, CI)

66-M. Structure of Spherulites in Nodular Cast Iron. H. E. Stauss, F. W. Von Batchelder, and E. I. Salkovitz. *Journal of Metals,* v. 3, Mar. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 249.

Results of X-ray studies. Concludes that the spherulites consist of aggregates of crystallites aligned radially to some extent. (M26, CI)

67-M. Intergranular Energy of Iron and Some Iron Alloys. Lawrence H. Van Vlack. *Journal of Metals,* v. 3, Mar. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 251-259.

Energy of the γ-Fe grain boundary was found to be 850 ergs per sq. cm. at 1105° C. The α/α and α/γ boundaries possess somewhat less energy. Microstructures of several Fe alloys are discussed in terms of interfacial-energy relationships. 24 ref. (M27, P10, Fe)

68-M. Precipitation and Diffuse Scattering in an Fe-Mo-Co Alloy. A. H. Geisler and F. E. Steigert. *Journal of Metals,* v. 3, Mar. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 259-260.

The permanent-magnet alloy "Comol," which contains 17% Mo, 12% Co, balance Fe, exhibits a precipitation reaction analogous to that at the iron end of the binary Fe-Mo system. (M24, N7, Fe, SG-n)

69-M. Bibliography of Electron Microscopy. Claire Marton, Samuel Sass, Max Swerdlow, Alan VanBronkhorst, and Harold Meryman. *National Bureau of Standards,* Circular 502, Aug. 1, 1950, 87 pages.

Covers books and survey articles on instrumentation, electron optics, related instruments, and applications prior to Jan. 1, 1950. (M21)

70-M. A New Type of X-Ray Scattering. *Nature,* v. 167, Feb. 24, 1951, p. 313-314.

Experimental results show that modification of the parent beam due to partial absorption in the lattice occurs in the case of metals, semiconductors, and insulators. (M22)

71-M. The Crystal Structure of Graphite in Cast Iron. W. S. Owen and B. G. Street. *Journal of the Iron and Steel Institute,* v. 167, Feb. 1951, p. 113-116.

Structures of graphite extracted from an Fe-C-Si alloy prepared from high-purity materials, and graphites from a variety of commercial cast irons were studied by an X-ray powder method. In all cases the structure was a mixture of the *a* and *b* structures found in other graphites of different origin. A correlation between microscopic appearance and crystal structure was established. Parameters of the unit cell were measured. Since no variation from the accepted value for pure graphite was found, it is concluded that the graphite occurring in Fe-C-Ci alloys and in commercial cast irons is practically pure carbon. 20 ref. (M26, N8, CI)

72-M. The Carbide Phase in Iron-Carbon-Silicon Alloys. W. S. Owen. *Journal of the Iron and Steel Institute,* v. 167, Feb. 1951, p. 117-120.

Dimensions of the unit cell of the crystal structure of the carbide phase extracted from a plain-carbon steel, a commercial white iron, a high-purity vacuum-melted Fe-C-Si alloy, and a similar alloy melted in air, were measured by a Debye-Scherrer, powder X-ray method. No variation in dimensions of the cell was found. Concludes that Si in Fe-C-Si alloys does not enter the carbide phase. This indicates that the position commonly accepted for the peritecto-eutectic point in the metastable diagram of the ternary system is probably considerably in error. 25 ref. (M24, M26, CI, Fe)

73-M. Phase-Contrast Microscopy in the Study of Metal Surfaces. D. McLean. *Metal Treatment and Drop Forging,* v. 18, Feb. 1951, p. 51-62.

The possibility of adapting ordinary microscopes to phase-contrast illumination. Includes comparative photomicrographs. (M21)

74-M. The Manipulation and Temperature Calibration of High-Temperature Debye-Scherrer X-Ray Cameras. R. L. Berry, W. G. Henry, and G. V. Raynor. *Journal of the Institute of Metals,* v. 78, Feb. 1951, p. 643-656.

Experiments designed to test temperature distribution between the furnaces of a Unicam high-temperature Debye-Scherrer X-ray camera. Reliability of internal calibration of the measuring thermocouple in terms of lattice spacings of a standard substance at various temperatures. Concludes that no method involving moving thermocouples is entirely satisfactory. A reliable method for determining temperature gradients in the specimen has been developed, involving attachment of fine thermocouples to copper wires, which are mounted in the position occupied by the specimen. Experiments on internal calibration vs. lattice spacings of pure silver show clearly that emissivities of standard and experimental specimens should be as nearly as possible identical. (M22, S16)

75-M. Effect of Crystal, Grain, and Particle Size on X-Ray Power Diffracted From Powders. (In English). Zigmond W. Wilchinsky. *Acta Crystallographica,* v. 4, Jan. 1951, p. 1-9.

A theoretical and experimental investigation was made on diffraction of X-rays from crystalline powders in which diffracted power is modified by powder coarseness and absorption inhomogeneities in the sample. Magnitude of the diffracted power is related to particle diameter, linear absorption coefficient, degree of compaction of the powder, crystal size, primary extinction coefficient, crystal-chemical composition, and grain size for polyphase particles. Theoretical predictions for a W-Fe mixture were substantiated experimentally. Measurements on heat treated Fe samples show that diffracted power decreases with increasing crystal size. 17 ref. (M22, W, Fe)

76-M. Existence and Structure of a New Phase in the System Mo-B. (In French). F. Bertaut and P. Blum. *Acta Crystallographica,* v. 4, Jan. 1951, p. 72.

Measurements showing existence of an MoB_2 phase. (M24, Mo, B)

77-M. Occurrence and Investigation of Oxide Inclusions in Steel. (In German.) Walter Koch. *Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleute e.V.,* v. 27, Sept.-Oct. 1950, p. 293-310.

Discusses, from the standpoint of the ceramic engineer, the metallurgical causes and prevention of oxide inclusions, their effects on the adhesiveness of enamels, and methods for separating them from steel. 12 ref. (M28, L27, ST)

78-M. Electron Diffraction Studies of Etched Au Leaf Films. W. V. Stauder and A. H. Weber. *Journal of the Franklin Institute,* v. 251, Mar. 1951, p. 351-357.

Anomalies occurring in electron-diffraction patterns of these films were of two kinds, extra lines and orientation effects. The extra lines were attributed to contamination by some long-chain compound. The orientation effects consisted of variation of intensities of several of the lines from those of the same lines observed in standard patterns of randomly oriented Au. Results confirm

the findings of other investigators, particularly those of Trillat and Hirsch. (M21, Au)

79-M. Differentiation of Grain Size and Phases in Titanium. Constance B. Craver. *Metal Progress,* v. 59, Mar. 1951, p. 371-373.

Use of polarized light. (M27, Ti)

80-M. Etching Steels Which Contain the Sigma Phase. John J. Gilman. *Metal Progress,* v. 59, Mar. 1951, p. 376B, 377.

Methods found most useful for high Cr-Ni stainless steels. (M21, SS)

81-M. Constitution of Iron-Chromium-Molybdenum Alloys at 1200° F. Spencer R. Baen and Pol Duwez. *Journal of Metals,* v. 3, Apr. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, p. 331-335.

Phase boundaries of the system were determined at 1200° F. by measuring lattice parameters of the various phases and drawing the parameter contours and the tie lines in the one-phase and two-phase regions, respectively. 13 ref. (M24, Fe, Cr, Mo)

82-M. Radioisotopes Aid Studies of High-Temperature Materials. W. E. Jones. *Steel,* v. 128, Mar. 26, 1951, p. 78.

Techniques and applications to microstructure studies. (M23, SG-h)

83-M. Long-Range Order in Beta-Brass and Cu_3Au. D. T. Keating and B. E. Warren. *Journal of Applied Physics,* v. 22, Mar. 1951, p. 286-290.

Measurements were made on single crystals of CuZn and Cu_3Au held at various temperatures below T_c to decide whether there is a single-ordered phase whose order changes with temperature, or whether there is an ordered and a disordered phase the relative amounts of which change with temperature. Precision measurements were made of position and width of the (222) CuZn and (400) Cu_3Au reflection. Measurements of the long-range order in Cu_3Au were made. 10 ref. (M26, N10, Cu, Au)

84-M. The Crystal Structure of the Sigma-Phase in the Co-Cr System. J. S. Kasper, B. F. Decker, and J. R. Belanger. *Journal of Applied Physics,* v. 22, Mar. 1951, p. 361-362.

Data obtained on a single-crystal specimen. Compares results with those of other investigators. (M26, Co, Cr)

85-M. The Apparent Ferrite-Cementite Ratio in Micrographs of Pearlite Structure. G. L. J. Bailey. *Research,* v. 4, Mar. 1951, p. 139-140.

In a recent discussion, Humes-Rothery commented on the difference in relative proportions of ferrite and cementite shown in electron micrographs of eutectoid steels presented by different authors. Suggests an explanation which predicts that the effect should be more commonly observed with fine pearlitic structures which can be examined in the electron microscope than with coarser structures examined in the light microscope. (M27, ST)

86-M. Gamma Ray Metallography. (Concluded.) Jean Ternisien. *Microtecnic* (English Ed.), v. 4, Nov.-Dec. 1950, p. 321-325. (Translated from the French).

11 references. (M23)

87-M. Borides and Silicides of the Platinum Metals. *Nature,* v. 167, Mar. 3, 1951, p. 362.

Each of the 12 binary systems comprising B or Si with Ru, Rh, Pb, Os, Ir or Pt was studied over the full range of composition. Phases listed in the accompanying table have been characterized. (M24, EG-c, B, Si)

88-M. Sigma-Phase in Transitional Metal Alloys. *Nature,* v. 167, Mar. 3, 1951, p. 365-366.

Existence of a phase isomorphous with the sigma-phase of the Fe-Cr system has now been proved in a number of other alloys containing transitional elements. A theory of atomic structure in which appearance of sigma-phase is predicted when electron-atom ratio falls within certain limits. 13 ref. (M27)

89-M. Intrinsic Crystalline Structure and the Strength of Metals. W. A. Wood. *Philosophical Magazine,* ser. 7, v. 42, Mar. 1951, p. 310-312.

Fundamental theories with reference to recent work of Fürth, Born, and Paterson. (M26, Q23)

90-M. Calculated and Experimental Constituitional Diagrams of Simple Binary Systems. (In Russian.) Ya. E. Geguzin and B. Ya. Pines. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser. v. 75, Nov. 21, 1950, p. 387-390.

Attempts to verify experimentally the validity of constitutional diagrams, plotted on the basis of theoretical considerations and appropriate formulas formerly proposed by one of the authors for the simple type of binary systems. Data are tabulated and charted for Cu-Ni, Ag-Pd, Ag-Au, Cu-Pd, Au-Pd and several other binary metallic systems. (M24)

91-M. The Nickel-Tin Bronze Theory. James S. Vanick. *Foundry,* v. 79, Apr. 1951, p. 130-133, 278-279.

Supplements report presented in the Feb. issue with a discussion of

the theory of the constitution and heat treatment of the Ni-Sn bronzes. Graphs and tables show effects of heat treatment and composition on mechanical properties. Photomicrographs show typical as-cast structures. (M24, Cu)

92-M. The Widened Lattice Interval and Its Essential Role in the Behavior of Crystalline Metal. Donald P. Smith. *Science,* v. 113, Mar. 30, 1951, p. 348-352.

Fundamental theories. Concludes that the widened lattice intervals are rifts in the crystal lattice, produced initially by plastic deformation but capable of extension or healing as conditions are varied. The rifts are apparently the distinctive characteristic of strained metal, responsible for at least some of its special properties—mechanical, magnetic, electrochemical, and presumably chemical. Existence and nature of the rifted state are demonstrated chiefly by the behavior of the metals with hydrogen. 47 ref. (M26)

93-M. The Experimental Study of Crystal Boundaries. Bruce Chalmers. *Canadian Mining and Metallurgical Bulletin,* v. 44, Mar. 1951, p. 207-209; disc. p. 209; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 137-139; disc. p. 139.

Elementary explanation of the technique and applications of the work being undertaken by the Physical Metallurgy Group, Dept. of Metallurgical Engineering, University of Toronto. (M26)

94-M. Critical Discussion of the Osann Diagram on the Basis of the Latest Research Results. (In German.) H. U. Doliwa. *Giesserei,* v. 38 (new ser., v. 4), Feb. 22, 1951, p. 79-80.

Refers to the C-Si diagram developed by Osann. Recent results show that three, not two, parts Si are equal to one part C in ferrous melts, while one part P counteracts one part Si. (M24, Fe, ST)

95-M. Research on Tempered Martensite. (In German.) Helmut Krainer. *Archiv für das Eisenhüttenwesen,* v. 22, Jan.-Feb. 1951, p. 53-61; disc. p. 62.

Hardened, tempered samples of unalloyed steel (1.07% C) were subjected to X-ray studies and coercive-force measurements in order to determine the lattice structure of martensite. Tempered at 100-200° C., martensite still has a distinct tetragonal structure, and its high hardness may be explained by the precipitated carbide phase. Coercive-force measurements were used to estimate average size of the precipitated cementite particles. Residual austenite was found to have a higher-than-average carbon content. 23 ref. (M27, ST)

96-M. An Automatic Apparatus for the Recording of Heat Content Curves and for Thermal Analysis at a Low Heating Rate. (In German.) Werner Jellinghaus. *Archiv für das Eisenhüttenwesen,* v. 22, Jan.-Feb. 1951, p. 65-71.

A modification of Sykes's apparatus which automatically controls heating rate of the specimen and records the heat-capacity curve. Several enthalpy curves of hardened and unhardened, unalloyed and slightly alloyed steels, which clearly indicate the decomposition of residual austenite in excess of 5%. 11 ref. (M23, P12, ST)

97-M. Vacuum Furnace for Metal Single Crystals. D. Lazarus and D. R. Chipman. *Review of Scientific Instruments,* v. 22, Mar. 1951, p. 211-212.

Modification which employs no moving parts within the high-vacuum system. (M23, N12)

98-M. A Simple Electrolytic Polishing Cell. M. N. Parthasarathi, B. S. Srikantiah, and B. R. Nijhawan. *Journal of Scientific and Industrial Research,* v. 10B, Feb. 1951, p. 46-48.

Laboratory apparatus and technique. Photomicrographs illustrate typical surface structure obtained. (M21)

99-M. Preparing Rod Specimens for X-Ray Photography. D. Summers-Smith. *Metallurgia,* v. 43, Mar. 1951, p. 154.

Technique. (M21)

100-M. Metallography of Carbon in Silicon-Iron Alloys Containing 4% Silicon. E. D. Harry. *Journal of the Iron and Steel Institute,* v. 167, Mar. 1951, p. 241-246.

Mode of occurrence of carbon in Si iron transformer sheets. Starts with the sheet bar, which may contain 0.050-0.10% C, and ends with the finished sheet, in which C content may vary from below the limit of solid solubility to 0.030%. Constitution of the carbide phase in these Si irons shows that this phase is duplex in structure, consisting of the ordinary iron-carbide, Fe_3C, and what is believed to be an Fe-Si-C compound, the two carbides appearing to form a eutectoid. 13 ref. (M26, N8, Fe)

101-M. The Problems of the Determination of Atomic Structures by Means of the Electron Microscope. (In German.) L. Wegmann. *Helvetica Physica Acta,* v. 24, Feb. 15, 1951, p. 63-71.

Shows theoretically that resolving power of uncorrected electron lenses

can be improved by limiting the field of concentric lens zones and that with this arrangement and by use of diffracted rays, it should be possible to determine the atomic structure of crystals. Includes diagrams and electron micrographs. 15 ref. (M25, M21)

102-M. (Book) International Conference on the Physics of Metals. 271 pages. 1949. Martinus Nijhoff, The Hague, Netherlands. (Reprinted from *Physica*, v. 15, p. 1-271).

The papers, which deal with structure, transformation, and physical and mechanical properties, were previously abstracted from originals. (M general, N general, P general, Q general)

103-M. Study of Precipitates of C and N in Iron With an Electron Microscope. John Radavich and Charles Wert. *Journal of Applied Physics*, v. 22, Apr. 1951, p. 367-371.

Study of the above in α-iron. The physical shapes of the precipitates were determined in each case as well as the fineness of dispersion. Results confirm the conclusions drawn from internal-friction measurements made of these alloys. Includes photomicrographs.
(M26, M21, N7, Fe, CN)

104-M. Lattice Distortion Spectrum of Evaporated Gold. P. G. Wilkinson. *Journal of Applied Physics*, v. 22, Apr. 1951, p. 419-423.

Gold was deposited in various pressures of N from 0.001 to 110μ at low temperatures. The electrical resistance, distortion spectrum, and final resistivities of the gold films are shown to be dependent on the film thickness. 25 ref.
(M26, P15, Au)

105-M. Hardmetals on WC-TiC-TaC Basis and Structure of the Carbide System WC-TiC-TaC. R. Kieffer. *Powder Metallurgy Bulletin*, v. 6, Apr. 1951, p. 22-25.

Microstructure, phase diagrams, hardness, and transverse rupture strength. (M24, Q27, Q29, C-n)

106-M. A Method for the Metallographic Preparation of Zirconium Boride. R. Wachtell. *Powder Metallurgy Bulletin*, v. 6, Apr. 1951, p. 62-66.

A new routine for polishing ZrB_2 for metallographic examination. Includes micrographs. (M21, Zr)

107-M. Examination of Metals by Polarized Light. E. C. W. Perryman and J. M. Lack. *Nature*, v. 167, Mar. 24, 1951, p. 479.

Discusses several recent papers on use of polarized light for revealing the grain structure of metals and alloys. Optical anisotropy of anodized Al and etched monel metal has been attributed to anisotropic properties of the surface film formed during anodizing or etching. A possible alternative explanation involves surface contour of the specimen. To decide which of these explanations is correct, electrolytically polished Zn and Cd, Al electropolished and anodized, and monel metal, were examined before and after evaporating a silver film onto the prepared surfaces. Results indicate that the polarization effects obtained with anodized Al and etched monel are due to surface structure and not to true optical anisotropy.
(M21, Al, Ni)

108-M. Internal Friction Measurement; Method for Investigating Structural Changes in Metals. A. S. Darling. *Metal Industry*, v. 78, Mar. 23, 1951, p. 223-225; Apr. 6, 1951, p. 271-273; Apr. 13, 1951, p. 291-292.

Although at present theory is much in advance of reliable experimental results, use of internal friction measurements may well prove to be a field of metallurgical research comparable to that now occupied by X-ray diffraction methods. 40 ref. (M23)

109-M. Micrographic, Microsclerometric, and Radiocrystallographic Detection of the Brittleness of Refined Low-Chromium Steel. (In French.) Pierre A. Jacquet, Helmut Bückle, and Adrienne R. Weill. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, Jan. 29, 1951, p. 411-413.

Metallographic studies of low-Cr steel showed that micrography can be used to detect the brittleness of carbon steel containing Cr as the only alloying element and also a relatively high P content. Microsclerometric analysis, especially x-ray, shows only very small differences between the states of cohesion and brittleness with respect to those previously observed with a Ni-Cr steel. (M21, M23, Q23, AY)

110-M. Spectrochemical Research on the Beryllium Effect in Magnesium Alloys. (In German.) Albert Keil. *Zeitschrift für Metallkunde*, v. 42, Jan. 1951, p. 13-16.

Published research indicates that Be—used to reduce the ignitability of Mg alloys is primarily concentrated in the surface of the castings and partly diffused into the adjoining zone. The Be has the undesirable effect of producing a coarser grain structure and consequent reduction in strength properties. 13 ref. (M27, Q23, Mg)

111-M. The Binary Silver-Indium System. (In German.) Erwin Hellner. *Zeitschrift für Metallkunde*, v. 42, Jan. 1951, p. 17-19.

On the basis of F. Weibke's results, a revised constitution diagram in the range 25-80% In is proposed. (M24, Ag, In)

112-M. Amorphous Germanium. (In German.) H. Richter and O. Fürst. *Zeitschrift für Naturforschung,* v. 6a, Jan. 1951, p. 38-46.

A new method for studying very thin vapor deposits. X-ray pictures and electron micrographs are evaluated and compared for molten and crystalline Ge. 18 ref. (M21, Ge)

113-M. Constitution Diagram of the $Ni-O_2$ System and Physicochemical Nature of the Solid Phases in This System. (In Russian.) D. P. Bogatskii. *Zhurnal Obshchei Khimii* (Journal of General Chemistry) v. 21 (83), Jan. 1951, p. 3-10.

Investigated by different methods of physicochemical analysis. Certain equilibria of processes of dissociation, reduction, and oxidation in this system were also studied, and thermodynamics of such equilibria determined. A constitution diagram of the system is presented. 18 ref. (M24, P12, R2, Ni)

114-M. Light Figures of Zinc Crystals. (In English.) Mikio Yamamoto and Jiro Watanabe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Feb. 1950, p. 81-95.

Light figures were observed on the three principal crystallographic planes of Zn crystals, which were etched for various intervals with various concentrations of aqueous solutions of different acids, alkalis, and salts. The suitability of observed figures for determining orientations of Zn crystals with the light-figure method was examined, and light figures obtained by etching for 20 min. with a boiling saturated aqueous solution of KOH was found to be the most suitable. (M26, Zn)

115-M. Orientation Determination of Zinc Crystals by the Light-Figure Method. (In English.) Mikio Yamamoto and Jiro Watanabe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Apr. 1950, p. 270-279.

Application of the above method to determination of orientations of Zn single crystals. Apparatus and technique. (M26, Zn)

116-M. Some Notes on the Barley Shell Structure in Iron-Silicon Alloys. R. V. Riley. *Journal of Metals,* v. 3, May 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 412.

How this structure may be produced and used in distinguishing between higher and lower Si areas in a micro-specimen of a ferrous material. (M27, Fe)

117-M. Structures and Mechanical Properties of a Mo-Ni-Cr Cast Iron. Edward A. Loria. *American Foundrymen's Society,* Preprint 51-8, Apr. 1951, 5 pages.

Microstructure and mechanical properties of 1.2-in. diam. bars of a gray iron containing 2.77% total carbon, 1.40% Si, 1.40% Mo, 1.00% Ni, 0.05% Cr as-cast and after tempering at 400, 600, and 700° F. Photomicrographs and 12 ref. (M27, Q general, CI)

118-M. Structure and Behavior of Grain Boundaries. M. R. Achter and R. Smoluchowski. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 77-90; disc. p. 90-91.

Some recent investigations into the nature of grain boundaries, in particular a study of preferential diffusion being made by the authors. Confined largely to work subsequent to 1940. 19 ref. (M27, N1)

119-M. Examination of Subgrain Structures With the Electron Microscope. Laurence Delisle and Gordon A. Davis. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 214-229; disc. p. 229.

Observations on W and Cu specimens. Effects of variations in annealing and working treatments. It is believed that systematic work on cold work, recrystallization, and diffusion with the electron microscope, should throw some light on actual nature of fine subgrain structures, existence of which appears imperative to explanation of the physical behavior of metals. 17 ref. (M27, Cu, W)

120-M. Diffuse X-Ray Scattering by Disordered Binary Alloys. William J. Taylor. *Physical Review,* ser. 2, v. 82, Apr. 15, 1951, p. 279-280.

Mathematical analysis. (M22)

121-M. Metallography in Industry and Research. June A. McNicol. *Australasian Engineer,* v. 44, Jan. 8, 1951, p. 73-78.

An illustrated survey of various techniques and their applications. (M21)

122-M. An X-Ray Study of Tin-Nickel Electrodeposits. H. P. Rooksby. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, 8 pages. (Advance Copy 5.)

Crystal structure and textural properties. (M26, Sn, Ni)

123-M. An Examination of Weld Metal by Means of the Electron Microscope. J. J. Brunt and A. N. Downer. *Nature,* v. 167, Apr. 21, 1951, p. 646-647.

Example in which X-ray diffraction and chemical analysis gave conflicting evidence concerning the nature of inclusions present. Electron-microscope examination clarified the difficulty. (M21, ST)

124-M. Discussion on the Paper: "The Influence of Low Percentages of Certain Elements on the Microstructure of Pure Iron-Carbon Alloys and Cast Irons," W. J. Williams. *Journal of the Iron and Steel Institute,* v. 167, Apr. 1951, p. 374-378.
(M27, Fe, CI)

125-M. Electrolytic Polishing and Oxidation of Titanium. Pierre A. Jacquet. *Metal Treatment and Drop Forging,* v. 18, Apr. 1951, p. 176, 182. (Translated from *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences.*
Previously abstracted from original. See item 62-M, 1951. (M21, Ti)

126-M. Some Industrial Applications of X-Ray Diffraction. N. J. M. Campbell. *Machinery* (London), v. 78, Apr. 19, 1951, p. 645-649.
Includes structural studies and inspection. (M22, S13)

127-M. The Stability of the Co_2Al_9-Type Structure in the Aluminum-Rich Alloys of the Aluminium-Iron-Cobalt-Nickel System. M. B. Waldron. *Journal of the Institute of Metals,* v. 79, Apr. 1951, p. 103-116.
Experimental technique for determination of the composition of the quaternary phase at the point where the eutectic relationship with $FeAl_3$ changes to the peritectic reaction. This was found to occur at the phase composition associated with the change in direction of the phase boundary and is in interesting verification of the dependence of stability of this type of intermetallic compound on electron-atom ratio. 12 ref. (M24, Al)

128-M. Replica Techniques in Electron Microscopy. A. E. Agar and R. S. M. Revell. *British Journal of Applied Physics,* v. 2, Jan. 1951, p. 8-11.
Precautions for obtaining clean and reliable replicas for study of large areas of metal surfaces. Modifications to the backed replica technique and the application of preshadowing in metallographic studies. (M21)

129-M. Summarized Proceedings of a Conference on the Development and Application of Fourier Methods in Crystal-Structure Analysis — London, Nov. 1950. A. J. C. Wilson. *British Journal of Applied Physics,* v. 2, Mar. 1951, p. 61-70.
23 references. (M22)

130-M. Absorption Edges on Debye-Scherrer X-Ray Photographs. R. Brooks. *British Journal of Applied Physics,* v. 2, Mar. 1951, p. 76-77.
On powder photographs taken with $K\alpha$ radiation obtained by filtering X-rays from a pure metal target through the appropriate "β-filter," sharp-edged bands which are not normal powder lines may occur in the low-angle region. These are shown to be due to residual X-rays of short wavelength which produce dark bands where fluorescence of silver and bromine occurs in the photographic emulsion. Typical data are tabulated. (M22)

131-M. Electropolishing for the Micrographic Study of Light Metals Rich in Silicon. (In French.) E. Knuth-Winterfeldt. *Revue de l'Aluminium,* v. 28, Mar. 1951, p. 84-86.
Technique and apparatus developed in Denmark. The electrolyte consists essentially of methyl alcohol, butyl cellosolve, and conc. HCl. The periods of polishing are separated by short intervals during which the current is reversed; this causes the removal of the very adhesive film formed from products of anodic dissolution. Includes micrographs. (M21, Al)

132-M. Contribution to the Study of Cast Irons With High Phosphorus Content. (In French.) Jean Galey. *Fonderie,* Jan. 1951, p. 2313-2326; disc., p. 2326-2328.
A comprehensive study of constitution diagram, structure, mechanical properties, and corrosion resistance of cast iron with high P content. Results indicate that it is possible to obtain a fine homogeneous structure, mechanical properties being only mediocre; however, corrosion resistance to acids seems to be satisfactory. 18 ref.
(M27, Q general, R5, CI)

133-M. Research on the Mn-In and Mn-Cd Systems. (In German.) Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 41, Nov. 1950, p. 399-400.
Preparation of the alloys and test results. Includes photomicrographs and a Mn-In constitution diagram. (M24, Mn, In, Cd)

134-M. The Ni-In System. (In German.) Erwin Hellner. *Zeitschrift für Metallkunde,* v. 41, Nov. 1950, p. 401-406.
Critical review of the literature. Includes phase diagrams and tables. 11 ref. (M24, Ni, In)

135-M. The Crystal Chemistry of Phases Richest in "B-Metal" in Alloys of the Transition Metals of the Fe and Pt Triads With Elements of the Fourth Subgroup. (In German.) Konrad Schubert and Hermann Pfisterer. *Zeitschrift für Metallkunde,* v. 41, Nov. 1950, p. 433-441.

Results of powder-diffraction study of $CoCe_2$, $PdSn_2$, $RhSn_2$, $CoSi_2$, $NiSi_2$, Ir_3Ge_7, and Pt_3In_7. Correlates the results with position in the periodic table. 34 ref. (M26)

136-M. The Fe-P-Co System. (In German.) Josef Berak. *Archiv für das Eisenhüttenwesen,* v. 22, Mar.-Apr. 1951, p. 131-135.

The constitution diagram was established by thermal, metallographic, and X-ray methods. Includes graphs, tables, and photomicrographs. (M24, Fe, Co)

137-M. Constitutional Diagrams—Establishment by High Temperature X-Ray Technique. E. C. Williams. *Metal Industry,* v. 78, May 4, 1951, p. 359-362.

With improved apparatus and technique, the difficulties which surmounted the advantages to be gained from the use of the high-temperature X-ray method for studying alloy constitution can no longer be considered serious. Suggests that the method might well be used for preliminary examination of new alloy systems. 10 ref. (M23, M24)

138-M. The Importance of Silicon in Niobium-Bearing Steels and Alloys. H. J. Goldschmidt. *Metallurgia,* v. 43, Apr. 1951, p. 157-160.

A ternary Fe-Cb silicide, with an approximate formula $Fe_4Cb_6Si_3$, was found by X-ray analysis in extracts from Cb-bearing austenitic heat resisting steels and in Se-rich ferrocolumbium. With the aid of this information, it is possible to explain satisfactorily the constitution of such steels as a collection of carbides, silicides and intermetallic compounds in an austenitic matrix, and to construct a tentative Fe-Cb-Si diagram. In heat resisting alloys containing Cb (probably also the other Group IV and V elements), Si plays, therefore, a role of comparable importance with that of C; to some extent, silicide and carbide-forming tendencies are competitive. (M24, AY)

139-M. Study of the Condition of the Surface of Fibrous Materials by Means of Replicas. (In French.) Jean-Jacques Trillat and Michel Besse. *Comptes Rendus hebdomadaires des Seances de l'Academie des Sciences,* v. 232, Feb. 12, 1951, p. 608-610.

Using a solution of gelatine and water, replicas of industrially used fibers, such as nylon, rayon, and papers were obtained, for microscopic study. The same method can also be used for studying metal surfaces. (M21)

140-M. Heterogeneity of Solid Solutions of Gold-Silver-Copper in an Antique Object. (In French.) Adrienne R. Weill. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Feb. 12, 1951, p. 630-632.

An Egyptian antique was analyzed by two nondestructive methods: X-ray diffraction and density measurements. The absence of alloy formation and some indications regarding technique of fabrication were shown. The alloy contained 69% Au, 28% Ag, and 2.3% Cu. (M22, M23, Au)

141-M. The Structure of the Carbide System TiC-TaC-WC. (In German.) H. Nowotny, R. Kieffer, and O. Knotek. *Berg-und Hüttenmännische Monatshefte,* v. 96, Jan. 1951, p. 6-8.

Metallographic and X-ray studies at 1450 and 2200° reveal an extensive homogeneous field of (Ti, Ta, W)C solid solution and a heterogeneous field composed of this saturated solid solution and practically pure WC. Method of producing the specimens and experimental procedure. Includes tables, ternary diagrams, and photomicrographs. (M24, C-n, Ti, Ta, W)

142-M. Dependence of Mechanical Properties on the Structure of Two-Phase Alloys. (In German.) H. Unckel. *Metall,* v. 5, Apr. 1951, p. 146-150.

Metallographic studies with steels, brasses, Al-Si, Zn-Sb, Cu-W, and Cu-graphite sintered metals showed that hardness, yield point, tensile and compression strength decrease with increasing distance between the cementite laminae, thickness of ferrite layers, thickness of α layers, grain size of matrix, and graphite content; but increase with increasing W content. Includes photomicrographs, tables, and graphs. (M27, Q general)

143-M. Investigations of the Titanium-Antimony System. (In German.) H. Nowotny and J. Pesl. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 82, Apr. 15, 1951, p. 336-343.

Ti-Sb alloys containing up to 60% Ti were investigated by X-ray, structural, and thermal analysis. Results show the almost complete insolubility of Ti in Sb and the existence of $TiSb_2$, TiSb, and at least one additional phase richer in Ti. Crystal structures of $TiSb_2$ and TiSb and the two phases were explained with respect to neighboring phases of similar structure. 10 ref. (M24, Ti, Sb)

144-M. Investigations of the Titanium-Lead System. (In German.) H. Nowotny and J. Pesl. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 82, Apr. 15, 1951, p. 344-347.

Results of X-ray and metallographic studies of Ti-Pb alloys containing up to 62.5% Ti. X-rays indicate a phase whose composition may be Ti_4Pb. (M24, Ti, Pb)

145-M. (Book) **Tables for Conversion of X-Ray Diffraction Angles to Interplanar Spacing.** 159 pages 1950. National Bureau of Standards, Washington, D. C. (Applied Mathematics Series 10.) (For sale by U. S. Gov't. Printing Office, Washington, D. C.)

Eight tables give spacing values in A. U. corresponding to the angles which are usually measured when diffraction patterns are used for chemical identification and crystal structure determination. The first six tables give spacing values for angles 0-90° at intervals of 0.01°. These tables were calculated using the $K\alpha$, radiation for X-ray targets of Mo, Cu, Ni, Co, Fe, and Cr. The last two tables contain a rearrangement of the data for Cu and Fe. (M22, Mo, Cu, Ni, Co, Fe, Cr)

146-M. Scattering Phenomena in Electron Microscope Image Formation. C. E. Hall. *Journal of Applied Physics,* v. 22, May 1951, p. 655-662.

Equations are derived for relative intensities in electron-microscope images formed without a limiting aperture in the objective lens. Three components of intensity at the image plane were distinguished. The equations involve two scattering cross sections, both readily measurable under normal operating conditions. Cross sections were measured for Be, SiO, Cr, Ge, Pd, Pt, and U. Effect of altering the beam potential; minimum detectable increment in speciment thickness due to scattering is estimated. 12 ref. (M21, Be, Cr, Ge, Pd, Pt, U)

147-M. A New X-Ray Diffraction Method for Studying Imperfections of Crystal Structure in Polycrystalline Specimens. Alfred J. Reis, Jerome J. Slade, Jr., and Sigmund Weissmann. *Journal of Applied Physics,* v. 22, May 1951, p. 665-672.

New double-spectrometer method. From intensity data of the diffracted spots and known angular settings of the specimen, angular range of reflection of the misaligned scattering regions in a crystallite is determined statistically. The instrument and the technique of the multiple exposure method. Statistical evaluation of the data, and a mathematical treatment introducing correction terms as functions of azimuth and of Bragg angle. A commercial Si powder specimen was investigated. (M22, Si)

148-M. Oriented Crystals in the Rolled Plates of Alloys. Shigeto Yamaguchi. *Journal of Applied Physics,* v. 22, May 1951, p. 680-681.

Etched surfaces of rolled plate of two stainless steels were detected by means of electron diffraction and the oxide-replica method of electron microscopy. (M27, Q24, SS)

149-M. Studies of Thin Films by Electron Diffraction. N. R. Mukherjee and Oliver Row. *Journal of Applied Physics,* v. 22, May 1951, p. 681-682.

New method for making samples under controlled conditions which provided an opportunity to study optimum conditions for getting good diffraction patterns. Illustrated by typical patterns of Al. (M22, Al)

150-M. The Constitution of Titanium-Rich Alloys of Iron and Titanium. H. W. Worner. *Journal of the Institute of Metals,* v. 79, May 1951, p. 173-188.

Results of metallographic and X-ray investigations. Results of the eutectoid transformations. (M24, Ti)

151-M. Identification and Crystal Habit of Chromium Carbide, $Cr_{23}C_6$, as Determined by Electron Diffraction. J. F. Brown and D. Clark. *Nature,* v. 167, May 5, 1951, p. 728. (M26, Cr, C-n)

152-M. Photomicrography Without Microscope or Camera. H. Courtney Bryson. *Paint Manufacture,* v. 21, May 1951, p. 176-178, 180.

In the procedure described a plastic replica is first taken. This thin film is then placed in an enlarger and a photomicrograph up to several thousand magnifications is readily obtained. (M23)

153-M. Distribution of Lead in Stainless Steel Studied by Means of High-Resolution Autoradiography. L. G. Erwall and M. Hillert. *Research,* v. 4, May 1951, p. 242-244.

Object of investigation was to determine the distribution of Pb in stainless steel containing only 0.004% Pb, since even small amounts cause rolling difficulties. Includes macrographs (7X) and micrographs (75X). (M23, Pb, SS)

154-M. Application and Limits of the Replica Process in the Electron-Microscopic Investigation of Metal Surfaces. (In German.) Johanna Hunger, *Zeitschrift für Metallkunde,* v. 42, Mar. 1951, p. 65-72.

Shows to what extent various metals and alloys lend themselves to this method. (M21)

155-M. Metallographic Techniques for High Purity Aluminum. Italo S. Servi and Nicholas J. Grant. *Journal of Metals,* v. 3, June 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 473. (M21, Al)

156-M. Applications of Polystyrene Particles in Conjunction With Shadow Casting to the Study of Polished Metallic Surfaces. I-Ming Feng. *Journal of Applied Physics,* v. 22, June 1951, p. 820-824.

Results of electron-microscope study. Negative collodion replicas were used. Determination of width and depth of scratches by means of polystyrene particles and shadow casting. Relative merits of different polishing techniques. (M21, L10)

157-M. Modification of a Positive-Replica Technique for Electron Microscopy. A. E. Austin and C. M. Schwartz. *Journal of Applied Physics,* v. 22, June 1951, p. 847-848.

In the technique previously described by the authors a thin positive Formvar replica was cast upon a thick negative polyvinyl alcohol replica which was subsequently dissolved away in water. This technique proved to be satisfactory in principle, but in the case of several alloys, corrosion occurred during drying of the aqueous solution of polyvinyl alcohol. This difficulty has been overcome by substitution of zapon Acquantite "A" lacquer for the water-soluble PVA. (M21)

158-M. Aluminum-Rich Binary Alloys. F. R. Morral, compiler. *Metal Progress,* v. 59, May 1951, p. 672B.

Tabulates crystal-structure types, size factors, solid solubilities, lattice constants, melting points and compositions of eutectic, and second phases. (M24, M26, A1)

159-M. The Structure of Thorium Dicarbide by X-Ray and Neutron Diffraction. Elton B. Hunt and R. E. Rundle. *U. S. Atomic Energy Commission,* AECD-3021, Dec. 11, 1950, 13 pages.

(M26, Th, C-n)

160-M. Investigation of Alloy Systems by Thermal Effects: Thermal Analysis. C. Sykes.. *Metal Industry,* v. 78, May 11, 1951, p. 379-381; May 18, 1951, p. 409.

Study of thermal effects can provide experimental data which may prove to be of great assistance in the establishment of equilibrium diagrams. Apparatus and typical data. (M23, M24)

161-M. Determination of Phase Boundaries in Solid Alloy Systems by a Diffusion Technique. C. E. Ransley. *Nature,* v. 167, May 19, 1951, p. 814.

Principle of the method is to segregate the cooperating phases of an alloy on a scale which, although it allows equilibrium to be attained by a diffusion anneal, is yet sufficiently coarse to allow differential chemical analysis to be carried out without difficulty. This can be done very simply by hot-rolling together fairly thick plates of different alloys to form a "sandwich," the alloys being chosen so that certain phases will appear only in one layer of the composite sheet. The total analysis of the sandwich corresponds to the composition of alloy investigated. The composite sheet is rolled to an appropriate thickness, annealed until diffusion is complete, and the separate layers analyzed to determine the final distribution of the mobile element or elements. Data for the Al-Si-Fe system (0.5% Fe and 0-0.75% Si) are charted and discussed. (M27, N1)

162-M. A Modification of the Cohen Procedure for Computing Precision Lattice Constants From Powder Data. (In English.) James B. Hess. *Acta Crystallographica,* v. 4, May 1951, p. 209-215.

The Cohen scheme for weighting the measurements of the lines of powder patterns is shown to be inappropriate, and a modified weighting is proposed. Examples illustrate the resulting improvement in precision. 13 ref. (M26)

163-M. Optical Methods in X-Ray Analysis. I. The Study of Imperfect Structures. (In English.) C. A. Taylor, R. M. Hinde, and H. Lipson. *Acta Crystallographica,* v. 4, May 1951, p. 261-266.

Two-dimensional gratings of holes in cardboard were made and their diffraction patterns observed in a specially constructed large spectrometer (the Bragg X-ray microscope). Application of the method to transition from the cubic to the hexagonal close-packed structure, and to the ordering process in $AuCu_3$. Some rules for guidance in interpretation of the X-ray diffraction patterns of imperfect structures. 18 ref. (M22)

164-M. Fine Structure of Electron-Diffraction Spots Due to Particle Shape and to the Method of Shadow-Casting. (In English.) Goro Honjo and Kazuhiro Mihama. *Acta Crystallographica,* v. 4, May 1951, p. 282.

The multiple fine structure of electron-diffraction rings due to the refraction effect of electrons at surfaces of crystalline particles provides a method of determining the shape of microcrystals by electron diffraction. Two examples of this method. (M22)

165-M. An X-Ray Technique for the Study of Substructures in Materials. (In English.) P. Gay and P. B. Hirsch. *Acta Crystallographica,* v. 4, May 1951, p. 284-285.

Technique which permits detection of particles misorientated by only a few minutes of arc. Three examples. (M22)

166-M. Application of the Electron Microscope in Inorganic Chemistry. (In German.) Kurt Beyerdorfer. *Fortschritte der chemischen Forschung,* v. 2, No. 1, 1951, p. 57-91.

Includes discussion of the electron microscopic and the preparation of samples. Examples of electron-microscopic studies of carbon, metals and alloys, hydroxides and oxides of bivalent metals, and of Al, ZnO, oxide smokes, and clay minerals. 90 ref. (M21)

167-M. A New Process for Preparation of Alloy Powders for Determining the Phase Boundaries of Metallic Systems. (In German.) F. Lihl. *Metall,* v. 5, May 1951, p. 183-187.

In the proposed process for studying the phase equilibria of metallic systems below 300° C., powders are formed by thermal decomposition or reduction of the solid solutions of compounds of the respective metals under conditions that will result in phase equilibrium of the metals. The procedure and several examples. (M21, H10)

168-M. Micrographic Quantitative Analysis of Ternary Alloys. (In Italian.) Salvatore Amari. *Metallurgia Italiana,* v. 43, Jan. 1951, p. 6-12.

Theoretical, mathematical analysis of binary and ternary relationships as shown on triangular diagrams. The diagrams and arguments do not mention actual alloys, but are generally applicable. (M24)

169-M. Chemical-Physical Research on Specimens of Fine Pyrite Agglomerates. (In Italian.) A. Molaroni. *Metallurgia Italiana,* v. 43, Feb. 1951, 74-79.

Results obtained by application of metallographic methods. By microscopic examination of these materials, it was possible to determine the real proportion in which the various phases are present, their relative distribution in the structure, and identity of the various oxides of Fe. Includes micrographs. (M27, Fe)

170-M. Zone Theory of Solids and Limits of Its Applicability. (In Russian.) F. F. Volkenshtein. *Uspekhi Fizicheskikh Nauk* (Progress in Physical Sciences), v. 43, Jan. 1951, p. 11-29.

Basic premises and certain defects of zone theory in application to crystal-lattice problems, limits of its applicability, applicability to metals and to nonmetals, etc. Two other methods of solving crystal-lattice problems. 15 ref. (M26)

171-M. Phase Diagrams. E. H. Bucknall and P. Hersch. *Metal Industry,* v. 78, June 1, 1951, p. 443-446.

Recommended procedures for use of phase diagrams in practical metallurgical studies. Special care needed in presenting and using phase diagrams for systems with volatile components. 15 ref. (M24)

172-M. The Electrolytic Polishing and Etching of Uranium. B. W. Mott and H. R. Haines. *Metallurgia,* v. 43, May 1951, p. 255-257.

As a result of a study of various methods a number of suitable solutions are suggested. Advantages and limitations. (M21, U)

173-M. An Improvement in the Micrographic Techniques for Study of Temper Brittleness of Low-Alloy Steel. (In French.) Pierre A. Jacquet. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Apr. 9, 1951, p. 1422-1424.

Improvement consists of taking an imprint of an electropolished surface, thus eliminating impurities. Experimental investigation of the method on a steel containing 0.26% C, 1.30% Cr, and 0.044% P, quenched in oil from the austenitic state, annealed for one hr. at 650° C., and then for 24 hr. at 525° C. (M21, Q23, AY)

174-M. (Book) **The Phase Rule and Heterogeneous Equilibrium.** John E. Ricci. 505 pages. 1951. D. Van Nostrand Co., Ltd., 250 Fourth Ave., New York 3, N. Y.

Basic information needed in solving a wide range of problems relating to identification and characterization of substances and the study of their interaction. Covers the phase relations of systems of 1-5 components—explaining the application of phase diagrams in the various types of systems. Includes a large number of specific examples, with literature references, chosen from many fields, including alloys. Footnote references. (M24)

175-M. (Book) **The Nature of Metals.** Bruce A. Rogers. 248 pages. 1951. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio, and Iowa State College Press, Ames, Iowa. $3.00.

One of a "Series for Self-Education". Arrangement of atoms in metals; theory of alloying; solidification; movement of atoms; the A3 transformation; theory of hardening of steel; deformation of metals; recrystallization; oxidation and corrosion. Includes glossary and questions. (M general, N general, Q24, R1, R2)

176-M. Report of Committee E-4 on Metallography. L. L. Wyman, chairman. *American Society for Testing*

Materials, Preprint 86, 1951, 3 pages.
Miscellaneous recommendations.
(M21)

177-M. Microstructure of Titanium. H. P. Roth. *Metal Progress,* v. 59, June 1951, p. 816B.
Metal was made from powder and sponge, and arc melted. Microstructures as extruded and annealed at 900° C. (M27, Ti)

178-M. Carbide Phase in Tempered Steel. *Metal Progress,* v. 59, June 1951, p. 878, 880.
Previously abstracted from "The Crystal Structure and Particle Size of the Carbide Phase in Tempered Steel", M. P. Arbuzov, *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR). See item 282-M, 1950. (M26, N8, CN)

179-M. Thorium-Carbon System. Premo Chiotti. *Atomic Energy Commission,* AECD-3072, June 5, 1950, 61 pages.
A tentative phase diagram was constructed from metallographic, X-ray, and melting-point data. The existence of two compounds, ThC and ThC_2, was verified. A method was devised for measuring electrical resistance at very high temperatures using automatic recording and control instruments. Also a furnace suitable for resistance heating of test bars under vacuum on an inert atmosphere. Evidence indicates existence of an allotropic modification of Th at temperatures above 1400° C. 27 ref. (M24, P15, Th, C-n)

180-M. Crystal Chemistry of the Metal Carbides and Their Importance in Metallurgy. (In German.) W. Epprecht. *Chimia,* v. 5, Mar. 15, 1951, p. 49-60.
Lattice structure, formation, and composition of carbides and their effects on the properties of alloys. 35 ref. (M26, C-n)

181-M. Q-Phase of the System Al-Cu-Mg. (In Russian.) M. S. Mirgalovskaya. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Mar. 11, 1951, p. 289-292.
Investigation of the central region of the constitutional diagram of the Al-Cu-Mg system revealed the presence of a new 5th ternary intermetallic phase, designated the Q-phase. This phase is very similar to the U and T phases of the same system. Location of the new phase and boundary of its solid solutions were established on the basis of microstructural analysis.
(M24, Al, Cu, Mg)

182-M. Observations on Cleavage and Polygonization of Molybdenum Single Crystals. Neng-Kuan Chen and Robert Maddin. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 531-532.
Observations made by means of Laue back-reflection technique.
(M26, N5, Mo)

183-M. The Crystal Structure of V_3Co. Pol Duwez. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 564.
In the course of an investigation of the V-Co system, two intermediate phases were found. One of these phases corresponds approximately to the stoichiometric composition VCo and is isomorphous with the sigma phase in the Fe-Cr system. The second phase has the composition V_3Co; its crystal structure is described in the present note. (M26, V, Co)

184-M. Metallography of Electro-Tinplate. J. E. Davies and W. E. Hoare. *Journal of the Iron and Steel Institute,* v. 168, June 1951, p. 134-140.
Samples of electro-tinplate from seven different sources were examined by two metallographic techniques—oblique cross-sectioning and surface examination after detinning. Suitable methods of preparation of micro-specimens were developed. A layer identified as $FeSn_2$ was observed in all flow-brightened samples. Reasons for crystallographic appearance of this compound. 19 ref. (M21, L17, Sn, CN)

185-M. Application of Electron Diffraction to the Study of Reactions Between Two Surfaces in Contact. (In French.) Lucienne Lecuir, Henry Bildé, and Jean Devaux. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Apr. 23, 1951, p. 1556-1558.
Proposes use of electron diffraction by reflection, because direct electron diffraction is not applicable to mixtures of powdered substances. Applicability of this method is demonstrated by study of a fused mixture of Al_2O_3 and NiO powders, also by study of a glass-metal seal (Mo on glass). Results show that electron diffraction makes possible study of reactions between solids. (M22)

186-M. Preparation of Ag-Mg Alloys in Thin Layers by the Simultaneous Evaporation of the Constituents in a Vacuum. (In French.) Stanislas Goldsztaub and Pierre Michel. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, May 16, 1951, p. 1843-1845.
A method of preparing Ag-Mg alloys of different composition.
(M21, Ag, Mg)

187-M. Point Method of Crystallographic Analysis. (In French.) Raymond Castaing and André Guinier. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences.* v. 232, May 21, 1951, p. 1948-1950.

Micro-analysis by diffraction gives not only the chemical composition of the microscopic inclusion, but also allows its crystalline network to be identified and the orientation and parameters of the latter to be determined. (M22, M26)

188-M. The Possibilities of Radiocrystallography as a Method of Non-Destructive Control. (In French.) A. Guinier. *Métaux: Corrosion—Industries,* v. 26, Mar. 1951, p. 131-134.

Procedure. Diagram shows a punched card designed for indexing the crystallographic properties of materials. (M23)

189-M. Study of Sub-Surface Layers by X-Rays. (In French.) C. Legrand. *Métaux: Corrosion—Industries,* v. 26, Apr. 1951, p. 166-169.

A Debye-Scherrer Chamber, which is quite precise, and allows the subsurface layers to be studied by diffracted rays at small angles. (M22)

190-M. The Determination of Inclusions. (In French.) M. Lacomble and J. Varetto. *Revue de Métallurgie,* v. 48, Mar. 1951, p. 199-204.

Anodic dissolution involves two processes: extraction of the inclusions and their analytical separation and determination. Reviews known facts and describes new experiments. (M23, ST)

191-M. The Problem of the Electrolytic Isolation of Carbides. (In German.) Paul Koch. *Archiv für das Eisenhüttenwesen,* v. 22, May-June 1951, p. 155-157.

Klinger and Koch's method as applied to Mo steel, using alternating current. The most favorable electrical conditions were determined. (M23, AY, C-n)

192-M. Structure of Ni-Al Alloys in β-Phase at High Temperatures. (In Russian.) L. N. Guseva and E. S. Makarov. *Doklady Akademii SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 1, 1951, p. 615-616.

Experimental investigation indicated that, with increasing temperature, the region of the solubility of Ni in Al increases. In the region of Ni concentration between 60 and 66 at. %, alloys heated up to 1340° C. are uniphase and possess a tetragonal structure. X-ray analysis of such alloys in the annealed state showed the presence of two phases $\beta + \alpha'(Ni_3Al)$, which is in agreement with the constitution diagram. Crystallographic constants of the uniphase are presented. (M24, Ni, Al)

193-M. On the Etched Surfaces of Nickel Single Crystals. Shigeto Yamaguchi. *Journal of Applied Physics,* v. 22, July 1951, p. 983-984.

Results of electron-microscope and diffraction study. (M26, Ni)

194-M. The Titanium-Hydrogen System for Magnesium-Reduced Titanium. A. D. McQuillan. *Journal of the Institute of Metals,* v. 79, July 1951, p. 371-378.

The constitution diagram of the above system was studied using Mg-reduced Ti, and the results are compared with those obtained for the same system when Van Arkel Ti was used. It was found that the system cannot be treated as a simple binary, but must be considered as a section through a multicomponent system. The results obtained in study of systems of Mg-reduced Ti with other metals are likely to be affected in the same way. (M24, Ti)

195-M. A Provisional Constitutional Diagram of the Chromium-Titanium System. M. K. McQuillan. *Journal of the Institute of Metals,* v. 79, July 1951, p. 379-390.

The system was studied by quenching methods over the whole range of compositions, and the general nature of the system established. At temperatures between 1360 and 1400° C., the elements appear to be completely soluble in one another; but, on quenching, the solution breaks up to form a compound, Cr_3Ti_2, and a body-centered cubic solid solution based on either the Cr or the β-Ti lattice. The β-Ti solution undergoes a eutectoid transformation at low temperatures to form Cr_3Ti_2 and α-Ti. Mechanism of the contamination of Cr-Ti alloys by O_2 and N_2. Alloys based on the β-Ti solid solution are likely to have useful mechanical properties. (M24, Cr, Ti)

196-M. An X-Ray Study of the Phases in the Copper-Titanium System. Nils Karlsson. *Journal of the Institute of Metals,* v. 79, July 1951, p. 391-405.

The general outline of the phase diagram is drawn. Four intermediate phases were found. The structure of each phase was determined. 16 ref. (M24, Cu, Ti)

197-M. A Further High Temperature α-Phase and a Note on σ—ξ Relations. H. J. Goldschmidt. *Research,* v. 4, July 1951, p. 343.

Existence of a high-temperature intermetallic Fe-Mo compound has been reported, having the structure of the σ-phase FeCr. A number of σ-isomorphs are now known and have been discussed in recent publications. A further compound of the σ-structure was observed, Co-Mo. It has the composition Co_2Mo_3; it is stable at high temperatures only,

but the pure σ-form can be retained by quenching, for instance, from 1375° C. Briefly discusses above relationship as observed in various binary and ternary systems, also the temperature effect. 11 ref.
(M24, Co, Mo)

198-M. Orientation Measurements on Large-Grained Polycrystalline Sheet. A. E. DeBarr. *Sheet Metal Industries,* v. 28, July 1951, p. 603-607.

Limitations of the various methods and precautions necessary for reliable results. 13 ref. (M26)

199-M. Recent Developments in Metallography. E. C. W. Perryman. *Metal Industry,* v. 79, July 13, 1951, p. 23-26.

A systematic account of the position and usefulness of new techniques in metallographic examination. Mechanical and electrolytic polishing methods. 11 ref.
(M21, Al, Cu, Zn, Mg, Cd, Sn, Pb, Ti)

200-M. Relation of Base Metal Surfaces to Plating Success. *Metal Progress,* v. 60, July 1951, p. 118, 122, 124, 130, 132, 134, 136, 138. (Condensed from "The Influence of Base Metal Surfaces on the Nature and Characteristics of Electrodeposited Metals," by A. T. Steer. Australian Institute of Metals, Physical Metallurgy Division, 1941, Symposium on Electrodeposited Metals.)

Crystal structure and metallography of base metal and influence on the electroplate. (M26, M27)

201-M. The Miscibility Gap in the Liquid Phase of the Lead-Silver-Zinc System. (In German.) Wolfgang Seither and Gertrud Helmold. *Zeitschrift für Metallkunde,* v. 42, May 1951, p. 137-141.

Shows that the region occupied by the two liquid phases investigated may be graphically represented in such a manner that the conodes fall on a plane perpendicular to the base and that the Cailletet-Mathias straight-line curve of the binary Pb-Zn system is projected as a plane in the ternary phase region.
(M24, Zn, Pb, Mg)

202-M. Twenty-Five More Years of Metallography. J. R. Vilella. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 605-619.

An appraisal of achievements that have contributed to the progress of microscopical metallography during the past 25 years. Photomicrographs. 10 ref. (M21)

203-M. Intermetallic Compounds in the System Molybdenum-Beryllium. Samuel G. Gordon, James A. McGurty, Gilbert E. Klein, and Walter J. Koshuba. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 637-638.

A study of the solid-state reaction between metallic Mo and Be at elevated temperatures. Tables of the interplanar spacings of $MoBe_2$ and $MoBe_{13}$ are given. (M26, Mo, Be)

204-M. Thermal Stability of the Chromium, Iron, and Tungsten Borides in Streaming Ammonia and the Existence of a New Tungsten Nitride. R. Kiessling and Y. H. Liu. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 639-642.

The Cr, Fe, and W borides were treated with ammonia at different temperatures. They are attacked, forming metal nitride and boron nitride. Results are summarized in tables. In the W-N system a new phase was observed, closely related to the known β-phase. 11 ref.
(M26, Cr, Fe, W)

205-M. Microstructural Instability of Steels for Elevated Temperature Service. G. V. Smith, W. B. Seens, H. S. Link, and P. R. Malenock. *American Society for Testing Materials,* Preprint 28, 1951, 18 pages.

Effect of exposure for 10,000 hr. (about 14 mo.) at 900, 1050, or 1200° F. on microstructure, hardness at room temperature, and notch-impact strength at different temperatures of 18 ferritic or austenitic steels which may be applied at elevated temperatures.
(M17, Q6, Q29, AY, SS)

206-M. Report of Committee E-4 on Metallography. L. L. Wyman, chairman. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 440-492.

Previously abstracted from *American Society for Testing Materials,* Preprint 103, 1950. See item 213-M, 1950. (M21, ST)

207-M. Some Effects of Austenitic Grain Size and Metallurgical Structure of the Mechanical Properties of Steel. G. M. Sinclair and T. J. Dolan. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 587-616; disc., p. 617-618.

Previously abstracted from *American Society for Testing Materials,* Preprint 15, 1950. See item 209-M, 1950. (M27, Q general, ST)

208-M. A New Electrolytic Polishing Method for Metallographic Investigations of Si-Rich Light Alloys. E. Knuth-Winterfeldt. *Engineers' Digest,* v. 12, July 1951, p. 222. (Translated and condensed.)

Previously abstracted from *Revue de l'Aluminium*. See item 131-M, 1951. (M21, Al)

209-M. Microscopical Studies on the Iron-Nickel-Aluminium System. Part II. The Breakdown of the Body-Centred Cubic Lattice. A. J. Bradley. *Journal of the Iron and Steel Institute*, v. 168, July 1951, p. 233-244.

Body-centered cubic alloys of the Fe-Ni-Al system may be classified as either β disordered or β ordered like NiAl. Contrary to the experience of earlier investigators, these alloys give rise to microsections which are readily recognized under oil immersion. Three main types of duplex alloy were identified. 18 ref. (M26, Fe, Ni, Al)

210-M. Chi Phase in Alloy Steels; Its Relationship to Sigma Phase. K. W. Andrews and P. E. Brooks. *Metal Treatment and Drop Forging*, v. 18, July 1951, p. 301-311.

Experimental observations, theoretical and structural aspects. Comparison of two phases. 24 ref. (M27, AY)

211-M. Phase Diagrams of the Ternary Systems Fe-Cr-W and Fe-Cr-Mo at Low Temperatures. H. J. Goldschmidt. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 249-257.

Investigated by X-ray analysis for a 600° C. equilibrium, using powder-diffusion methods. Behavior of the sigma and xi phases, which are largely competitive and tend to inhibit each other, and of the primary alpha solid solutions; the latter form miscibility bays with potential precipitation-hardening effect. Practical applications of the two alloy systems are pointed out. 27 ref. (M24, Fe, Cr, Mo)

212-M. The Constitution of the Chromium-Rich Alloys of Chromium and Beryllium. A. R. Edwards and S. T. M. Johnstone. *Aeronautical Research Laboratories*, Commonwealth of Australia, Report SM 161, Nov. 1950, 20 pages.

Constitution diagram of the Cr-rich alloys which has been found to consist of a eutectic between the α solid solution and an intermediate phase β based on $CrBe_2$. Theory of alloying and the development of heat resisting materials. (M24, Cr, Be)

213-M. Study of Lower Bainite With the Electron Microscope. (In French.) P. Coheur and L. Habraken. *Revue Universelle des Mines, de la Metallurgie des Travaux Publics, des Sciences et des Arts Appliqués a l'Industrie*, v. 94, Mar. 1951, p. 107-111.

Study of bainite needles shows that their structure is either lamellar or finely distributed. These substructures obey an orientation law, forming on the (111) planes of austenitic lattice structure. (M27, ST)

214-M. Electron Diffraction Study of the Surface Structure of Mechanically Polished Alloys. (In French.) N. Takahashi. *Métaux; Corrosion-Industries*, v. 26, May 1951, p. 189-197.

Face-centered alloys were studied by electron diffraction and two types of structure were discovered which depended on the rate at which polishing occurred. A variety of alloys were used as samples. 17 ref. (M22, AY)

215-M. The Influence of Impurities and of Recrystallization on Crystal Orientation in the Spinning and Drawing of Copper. (In French.) Paul Bastien and Jean Pokorny. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 26, June 25, 1951, p. 2447-2449.

A short discussion, including a graph. (M26, G13, G4, Cu)

216-M. Principles of the Experimental Study of Pseudo-Symmetrical Crystal-Lattices With the Aid of Debye-Scherrer Diagrams. Application to Some Solid Solutions. (In French.) René Faivre. *Revue de Métallurgie*, v. 48, June 1951, p. 447-461.

The above principles are discussed and applied to the study of the PbO_2 system and to martensite. 22 ref. (M26, Pb, ST)

217-M. Crystallochemical Research of the Mn-As, V-Sb, Ti-Sb Systems. (In German.) H. Nowotny, R. Funk, and J. Pesl. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 82, No. 3, 1951, p. 513-525.

X-ray studies show the Mn_3As phase in the Mn-As system, the VSb_2 phase in the V-Sb system, and the Ti_4Sb phase in the Ti-Sb system. Crystal structures of these compounds. (M24, Mn, As, V, Sb, Ti)

218-M. Research on Transformations in the Platinum-Iron System. (In German.) Albrecht Kuhmann and Gotho Gräfin v. Rittberg. *Zeitschrift für Metallkunde*, v. 42, Dec. 1950, p. 470-477.

Investigated by magnetic, electric, dilatometric, and X-ray methods. Result is a rather drastic modification of the old Fe-Pt constitution diagram. 12 ref. (M24, Fe, Pt)

219-M. The Nickel-Gallium System. (In German.) Erwin Hellner. *Zeitschrift für Metallkunde*, v. 42, Dec. 1950, p. 480-484.

Thermal analyses and X-ray recordings were made to determine constitution diagrams, phase boun-

daries, and crystal structures of the Ni-Ga system. (M24, Ni, Cu)

220-M. The Structure of Electrolytic Alloy Deposits. III. Copper-Lead and Silver-Bismuth Alloys. (In German.) Ernst Raub and Annemarie Engel. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 485-491.

X-ray and metallographic studies were made and resistance and hardness measurements taken in order to study structure and properties of above alloys before and after annealing. Electrolytic alloys were compared with cast and recrystallized alloys.
(M27, Cu, Pb, Ag, Bi)

221-M. The Sigma Phase in Alloys Containing Iron and Chromium. (In English.) C. Vollers. *Metalen,* v. 6, June 15, 1951, p. 199-206; June 30, 1951, p. 221-227.

When Fe-Cr alloys are heated to a high temperature, a brittle phase, the sigma phase, may be separated, which can have an unfavorable effect on properties of the material. This phenomenon also occurs in many stainless and heat resistant steels. Formation of sigma phase is promoted by the presence of such alloying elements as Mn, Si, Mo, Cb, and N. On the other hand, C and Zr prevent or delay sigma formation. Effects of Ni and Ti; properties of sigma phase; and susceptibility to formation of sigma phase of the various stainless and heat resistant steels. Etching methods and X-ray procedures. (M26, Fe, Cr, SS SG-h)

222-M. The Constitutional Diagram of the Chromium-Tungsten System. H. T. Greenaway. *Aeronautical Research Laboratories, Commonwealth of Australia,* Report SM169, May 1951, 17 pages.

Investigated by metallographic, x-ray, and thermal analysis methods. The formation of 2-phase alloys at the Cr-rich end was shown to be accompanied by an increase in hardness. Thus such alloys show promise as suitable heat resistant alloys. (M24, Cr, W, SG-h)

223-M. The Equilibrium Diagram of the System Iron-Zinc. G. V. Raynor. *Institute of Metals,* Annotated Equilibrium Diagrams No. 8, June 1951, 7 pages.

33 references. (M24, Fe, Zn)

224-M. The Equilibrium Diagram of the System Antimony-Lead. G. V. Raynor. *Institute of Metals,* Annotated Equilibrium Diagrams No. 9, June 1951, 5 pages.

29 references. (M24, Sb, Pb)

225-M. Electrolytic Polishing of Nickel. P. A. Jacquet. *Metal Progress,* v. 60, Aug. 1951, p. 65.

Comments on article by Glen W. Wensch (Nov. 1950 Issue.) (See item 348-M, 1950). Believes that a solution of perchloric acid and acetic anhydride is better than the orthophosphoric acid proposed by Wensch for the above purpose. (M21, Ni)

226-M. Gradient Methods in Research. Albert Portevin. *Metal Progress,* v. 60, Aug. 1951, p. 64-65.

In study of phenomena involving many variables, a "gradient method" which consists in replacing the discontinuous series of changes in the variable made at different times, with a continuous variation of the variable in a single sample, is often used to reduce work. Well-known examples and new possible applications. How two variables can be studied at once by setting up gradients at right angles.
(M23, J26, Q general)

227-M. Preparation of Replicas for Electron Metallography. William J. Craig. *Metal Progress,* v. 60, Aug. 1951, p. 68-71.

Various techniques and details of method used to make plastic parlodion replicas. Typical results. (M21)

228-M. Structures of Uranium. J. Thewlis. *Nature,* v. 168, Aug. 4, 1951, p. 198.

Results of X-ray examination of uranium at high temperature. Unit-cell dimensions of α, β, and γ uranium, also of U + 1.4% Cr, are tabulated and discussed in comparison with previously reported values.
(M27, U)

229-M. Crystal Dislocations. Elementary Concepts and Definitions. F. C. Frank. *Philosophical Magazine,* ser. 7, v. 42, Aug. 1951, p. 809-819.

The elementary concepts of crystal dislocation theory—in particular the Burgers vector, perfect and imperfect dislocations, sessile dislocations, extended dislocations, twin and twinning dislocations—are defined in a manner independent of particular crystal lattices or models or special orientations of the dislocation. (M26)

230-M. A Theory of the α, α' Phases in the Al-Zn System. R. S. Leigh. *Philosophical Magazine,* ser. 7, v. 42, Aug. 1951, p. 876-882.

In binary Al-Zn alloys there is, above a certain temperature, a mixed crystal region in which the two phases α and α' both have the same face-centered cubic structure, but with different compositions and lattice spacing. Shows that an explanation of the formation of these phase boundaries is provided by the electronic theory of the elastic properties of single crystals of Al.
(M26, Al, Zn)

231-M. Overlap Forces and Elastic Constants of Body-Centered Cubic Metals. Irvin Isenberg. *Physical Review,* ser. 2, v. 83, Aug. 1951, p. 637-640.

Shows the interactions between neighboring ions which one must postulate so that these alloys are stable under a (110)[110] shear. This explains why, in all known cases, the β-phase either disappears at low temperatures or becomes ordered. The elastic constants of tungsten were also examined; the contribution of ion-ion overlap to these constants is obtained by subtracting estimated value of other contributions from experimental values. 10 ref. (M26, Q21)

232-M. Some New Bitter Patterns on a Single Crystal of Nickel. L. F. Bates and G. W. Wilson. *Proceedings of the Physical Society,* v. 64, sec. A, Aug. 1951, p. 691-695.

Some new Bitter figures were obtained on a single crystal of Ni whose surface is a (111) plane when magnetized along a [110] direction, and a curve obtained of domain boundary spacing as a function of effective magnetic field. Patterns of a complex nature, probably due to closure domains, were also obtained on a (112) plane. (M26, Ni)

233-M. A Metallurgical Investigation of Silver Chloride. R. D. Moeller, F. W. Schonfeld, C. R. Tipton, Jr., and J. T. Waber. *Transactions of American Society for Metals,* v. 43, 1951, p. 39-66; disc., p. 66-69.

Previously abstracted from *American Society for Metals,* Preprint 7, 1950. See item 306-M, 1950.
(M26, P general, Q general)

234-M. Structure of Permanent Magnet Alloys. A. H. Geisler. *Transactions of American Society for Metals,* v. 43, 1951, p. 70-101; disc., p. 101-104.

Previously abstracted from *American Society for Metals,* Preprint 9, 1950. See item 307-M, 1950.
(M24, N general, SG-n)

235-M. The Ternary System Chromium-Molybdenum-Iron. J. W. Putman, R. D. Potter, and N. J. Grant. *Transactions of American Society for Metals,* v. 43, 1951, p. 824-847; disc., p. 847-852.

Previously abstracted from *American Society for Metals,* Preprint 26, 1950. See item 308-M, 1950.
(M24, J general, Cr, Fe, Mo)

236-M. The Ternary System Indium-Cadmium-Zinc. S. C. Carapella, Jr., and E. A. Peretti. *Transactions of American Society for Metals,* v. 43, 1951, p. 853-872.

Previously abstracted from *American Society for Metals,* Preprint 27, 1950. See item 309-M, 1950.
(M24, Cd, In, Zn)

237-M. Constitution and Mechanical Properties of Zirconium-Iron Alloys. E. T. Hayes, A. H. Roberson, and W. L. O'Brien. *Transactions of American Society for Metals,* v. 43, 1951, p. 888-904; disc., p. 904-905.

Previously abstracted from *American Society for Metals,* Preprint 29, 1950. See item 310-M, 1950.
(M24, Q23, Fe, Zr)

238-M. A Study of Cleavage Surfaces in Ferrite. E. P. Klier. *Transactions of American Society for Metals,* v. 43, 1951, p. 935-953; disc., p. 953-957.

Previously abstracted from *American Society for Metals,* Preprint 31, 1950. See item 311-M, 1950.
(M21, M23, Q24, Fe)

239-M. Discussion on "The Constitution of Alloys". Charles W. Tucker, Jr. *U. S. Atomic Energy Commission,* AECD-3092, Mar. 13, 1951, 2 pages.

Discusses "The Constitution of Uranium-Molybdenum Alloys". P. C. L. Pfeil. *Journal of the Institute of Metals.* (See item 333-M, 1950).
(M24, Mo, U)

240-M. X-Ray Camera for Continuous Recording of Diffraction Pattern-Temperature Diagrams. (In English.) Einar Stenhagen. *Acta Chemica Scandinavica,* v. 5, No. 5, 1951, p. 805-814.

The camera was designed mainly for the study of polymorphism in long-chain compounds, but should prove useful for other purposes, such as study of thermal expansion of crystals and for phase analysis of mixtures. (M22)

241-M. The Metallography of the Light Metals. I. The Texture of Pressed Al-Cu-Mg Alloys Shown by Photomicrographs. (In German.) Hans Kostron and Margarete Schippers. *Metall,* v. 5, July 1951, p. 299-300.

A new process for revealing structure of an extended Al alloy in which etching forms a deposit of colloidal Cu whose shrinkage cracks, upon drying, follow lines of orientation of underlying grain structure.
(M21, Al)

242-M. Constitution and Properties of Cobalt-Iron-Vanadium Alloys. D. L. Martin and A. H. Geisler. *American Society for Metals,* Preprint 1, 1951, 21 pages.

A portion of the Co-Fe-V phase diagram near the equiatomic FeCo composition was determined by thermal analyses and X-ray diffraction studies. These results showed that thermal treatments could promote both the precipitation of an austenitic phase as well as ordering in the ferritic phase. Changes in hardness and magnetic properties

in the course of heat treatment were studied for a variety of Co-Fe-V alloys. (M24, N8, Fe, Co)

243-M. Phase Relationships in the Iron - Chromium - Vanadium System. Howard Martens and Pol Duwez. *American Society for Metals,* Preprint 2, 1951, 10 pages.

Phase boundaries of the above system were investigated at 700° C. 120 alloys were prepared by powder-metallurgy methods or by melting in a helium-arc furnace. The alloys were aged in vacuum for 10 days at 1290° F. Phases present in the alloys after aging were determined by X-ray diffraction. 10 ref. (M24, Fe, Cr, V)

244-M. A Partial Titanium-Chromium Phase Diagram and the Crystal Structure of $TiCr_2$. Pol Duwez and J. L. Taylor. *American Society for Metals,* Preprint 3, 1951, 19 pages.

Concerned with the part of the Ti-Cr diagram involving solid-state reactions in Ti-rich alloys. It is shown that Cr is soluble in beta-Ti to the extent of 25% at 1100° C. 10 ref. (M24, M26, Ti, Cr)

245-M. The Titanium-Silicon System. M. Hansen, H. D. Kessler, and D. J. McPherson. *American Society for Metals,* Preprint 4, 1951, 19 pages.

Special techniques were used for preparation and heat treatment of the highly reactive Ti-Si alloys. The phase diagram for the entire composition range was established, using metallography of cast and variously heat treated specimens, X-ray diffraction analysis, detection of incipient melting, and thermal analysis as principal tools. (M24, Ti, Si)

246-M. The Indium-Antimony System. T. S. Liu and E. A. Peretti. *American Society for Metals,* Preprint 5, 1951, 7 pages.

Investigated by thermal, X-ray, and metallographic methods. Existence of an intermediate phase corresponding closely to the composition InSb was confirmed. (M24, In, Sb)

247-M. Carbide Reactions in High Temperature Alloys. J. R. Lane and N. J. Grant. *American Society for Metals,* Preprint 10, 1951, 22 pages.

The structures of high temperature alloys, ranging from simplified Vitallium to the complicated N-155 and S-816 were investigated. The procedures involved microscopic examinations of the alloys, including quantitative measurement of the phases, and also separation of the carbides from the alloys by an electrolytic process. The separated carbides were analyzed chemically and by X-ray diffraction. (M26, SG-h, C-n)

248-M. Electrolytic Etching—The Sigma Phase Steels. John J. Gilman. *American Society for Metals,* Preprint 12, 1951, 31 pages.

A particular sequence of etches was applied to a range of stainless steel compositions. Strong hydroxide solutions, used electrolytically for etching stainless steels, color the sigma phase more rapidly than the carbides if the solutions are concentrated, and vice versa if they are dilute. An explanation of this phenomenon is proposed. Use of acetate solutions for electrolytic etching; observations of color films produced by alkaline etchants. Shows that "characteristic cracks" in the sigma phase of stainless steels are associated with the etch film and not with cracks in the underlying sigma phase. 12 ref. (M21, SS)

249-M. Some X-Ray Diffraction and Electron Microscope Observations on Temper-Brittle Steels. S. R. Maloof. *American Society for Metals,* Preprint 22, 1951, 11 pages.

Four low-alloy steels of varying degrees of susceptibility to temper embrittlement were subjected to an X-ray diffraction and electron-microscope study. Following an embrittling treatment, there is a definite decrease in the lattice parameter of ferrite for all steels. However, the decrease is least for SAE4340 steel. The carbide phase, extracted from samples of all steels given the embrittled and nonembrittled treatments, possesses the same cementite type of structure—designated at $(Fe, Cr)_3C$—the essential difference being a variation in the percentage of Cr in the carbide phase. 11 ref. (M27, AY)

250-M. Grain Shapes and Other Metallurgical Applications of Topology. Cyril Stanley Smith. *American Society for Metals,* Preprint 37, 1951, 42 pages.

Space-filling restrictions are formulated mathematically and used to explain known facts about grain shapes. Similarity between the shapes of metal grains and those of biological cells and soap bubbles. The conflict between space-filling requirements and those of local surface-tension equilibrium is shown to be responsible for grain growth because of the inevitable introduction of curvatures. Simple applications of topology in the study of the relations between phase fields in ternary diagrams, and of crystalline interfaces. It is shown that perfectly coherent interfaces are possible between lattices differing in coordination number, even though they may differ in orientation and spacing. It is believed that the martensite-austenite interface is of this kind. 36 ref. (M27, N3)

251-M. On Equations of State and the Phase Diagrams of Simple Binary Alloys. A. W. Lawson. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 85-101.

A simple equation of state for binary alloys and how the various types of simple phase diagrams may be derived therefrom; how the latter alter in form as the parameters which may be given simple physical interpretations are varied. (M24)

252-M. Application of Electromotive Force Measurements to Phase Equilibria. F. J. Dunkerley and G. J. Mills. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 47-84.

Principles are explained by using real and hypothetical-type binary metal systems as examples. Phase diagrams of the Zn-Sn and Sn-Bi systems were completely calculated for temperatures above the eutectic temperature, fair agreement with thermal analysis data being observed in all cases, except that the liquidus of Endo on the Bi side was too low. A major portion of the Pb-Bi phase diagram was calculated for temperatures above the eutectic temperature. The calculations were also correlated with X-ray and thermal analysis. 32 ref. (M23, Pb, Sn, Bi)

253-M. Microradiography Applied to Leaded Copper-Base Alloys. J. G. Kura, L. W. Eastwood, and J. R. Doig. *Foundry,* v. 79, Sept. 1951, p. 90-91, 254-260.

Use of microradiography to provide accurate interpretations from observation of metallurgical specimens. First of three articles based on investigations sponsored by the Brass and Bronze Ingot Institute at Battelle Memorial Institute. 25 ref. (To be continued.) (M23, Cu)

254-M. Theory of Metals and Alloys. W. Hune-Rothery. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 1111-1130.

Magnesium is used to illustrate and explain the theory of the relationship of atomic or electronic structure to properties of metals and alloys. (M25, P general, Mg)

255-M. Crystal Structure of Ti_5Si_3, Ti_5Ge_3, and Ti_5Sn_3. Paul Pietrokowsky and Pol Duwez. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 772-773.

The crystal structure of the compound Ti_5Ge_3 was determined from X-ray powder diffraction data. Related Si and Sn compounds were found to be isomorphous. Unit-cell dimensions, axial ratios, and parameters for equivalent atomic positions are given. (M26, Ti, Si, Ge, Sn)

256-M. Lattice Parameter of InSb. T. S. Liu and E. A. Peretti. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 791.

X-ray photograms were taken with a Debye and a back-reflection focusing camera, using characteristic cobalt Kα radiation. Lattice parameters were calculated by Cohen's method. Results at 25° C. are tabulated. (M26, In, Sb)

257-M. Equilibrium Relations in Magnesium-Aluminum-Manganese Alloys. Benny J. Nelson. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 797-799.

Liquidus and solidus determinations were made in the ternary system Mg-Al-Mn and these are shown by a series of curves. Both metallographic examinations and stress-rupture methods were used to determine the solidus temperatures of Mg-Al-Mn alloy wires. 11 ref. (M24, Al)

258-M. Crystal Structure of UAl_4. Bernard S. Borie, Jr. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 800-802.

Studies show that the Al-rich, U-Al intermetallic compound has the formula UAl_4. Its unit cell is body-centered orthorhombic. The number and kinds of nearest neighbors and the interatomic distances for the various atoms in the unit cell are tabulated. (M26, Al)

259-M. Recent Developments in Metallography. E. C. W. Perryman. *Metal Industry,* v. 79, July 20, 1951, p. 51-53; July 27, 1951, p. 71-73; Aug. 10, 1951, p. 111-113; Aug. 17, 1951, p. 131-133.

Comprehensive review. 41 ref. (M general)

260-M. Phase-Contrast Metallography. E. C. W. Perryman and Mary Lack. *Metallurgia,* v. 44, Aug. 1951, p. 97-102, 110.

The phase-contrast microscope and its metallurgical application. Examples showing its sensitivity in revealing small differences in surface level. 11 ref. (M21)

261-M. Statistical Fluctuation of Intensity in Debye-Scherrer Lines Due to Random Orientation of Crystal Grains. Hans Ekstein. *National Advisory Committee for Aeronautics,*

Technical Note 2447, Aug. 1951, 20 pages.

Fluctuations of intensity for cases in which the only causes of line breadth are the natural spectral width of the primary radiation and the finite size of the grains. The mean deviation of the centroid of the intensity curve from the Bragg angle for the strongest wave length can be considered as the error in measuring the line. This deviation is theoretically estimated. Equations and diagrams. (M22)

262-M. A Specially Constructed Metallograph for Use at Elevated Temperatures. Joe E. Jenkins, Donald R. Buchele, and Roger A. Long. *National Advisory Committee for Aeronautics,* Research Memorandum E51G12, Sept. 11, 1951, 21 pages.

Metallographic microscope developed with provision for heating a specimen to 1800° F. in protective atmospheres, that is, vacuum or gas. Changes in specimen microstructure were observed and recorded on 35-mm. motion-picture film. Resulting pictures were projected as motion pictures and individual frames were cut and enlargements made for close observation. Structural changes upon heating a 0.35% C. annealed carbon steel and a 5% Sn phosphor-bronze specimen were observed and recorded. (M21, CN, Cu)

263-M. The Room Temperature Solubility of Iron in Copper. T. S. Hutchison and James Reekie. *Physical Review,* ser. 2, v. 83, Aug. 15, 1951, p. 854-855.

Direct measurements, at room temperature, were made of density and of lattice parameter of a number of Cu-Fe alloys containing up to 1.4% Fe. (M26, Cu)

264-M. Atomic Arrangements in Gold-Nickel Solid Solutions. P. A. Flinn and B. L. Averbach. *Physical Review,* ser. 2, v. 83, Sept. 1, 1951, p. 1070.

Measurements of diffuse X-ray scattering from Ni-Au solid solutions were made by both photographic and Geiger counter spectrometer techniques. Results were obtained for alloys containing 10-90% Au, and measurements were made at 900° C. as well as on specimens quenched from 900° C. to room temperature. Results indicate that there is no clustering of like atoms in these solid solutions. (M24, M26, Au, Ni)

265-M. X-Ray Asterisms From Deformed Crystals. P. Gay and R. W. K. Honeycombe. *Proceedings of the Physical Society,* v. 64, sec. A, Sept. 1, 1951, p. 844-845.

A study made on a specimen of Al. Asterism is mainly caused by the kink bands, which are regions of curvature on a microscopic scale. (M22, Al)

266-M. The Iron-Nitrogen System: The Preparation and the Crystal Structures of Nitrogen-Austenite (γ) and Nitrogen-Martensite (α'). K. H. Jack. *Proceedings of the Royal Society,* ser. A, v. 208, Aug. 22, 1951, p. 200-215.

Investigates the binary and ternary interstitial alloys of Fe, C, and N_2. Evidence of the location of the interstitial atoms in nitrogen-austenite and in nitrogen-martensite; structural features of these phases are compared with those of the corresponding Fe-C alloys. 40 ref. (M24, Fe)

267-M. The Occurrence and the Crystal Structure of α''-Iron Nitride; a New Type of Interstitial Alloy Formed During the Tempering of Nitrogen-Martensite. K. H. Jack. *Proceedings of the Royal Society,* ser. A, v. 208, Aug. 22, 1951, p. 216-224.

Investigation shows that the new Fe-N phase is a transition phase in the decomposition of nitrogen-martensite, to ferrite and Fe_4N and is also a martensite in which ordering of the interstitial atoms is complete. 10 ref. (M26, Fe)

268-M. High Temperature Microscopy With a Reflecting Objective. G. C. Smith and M. J. Olney. *Research,* v. 4, Sept. 1951, p. 437-438.

Using a furnace designed for high-temperature microscopy, and a bispherical reflecting microscope objective of 0.5 N.A., it was possible to observe and record photographically the formation of graphite on the surface of hypereutectoid steels cooled in vacua from the austenite range. (M21, CN)

269-M. Method of Microscopic Examination of Metallic and Petrographic Samples at High Temperatures by Means of a Heated Platinum Vessel, Involving Possibility of Gaseous Attack. Examples of Use. (In French.) Jean R. Marechal and Marcel Doucet. *Revue de Métallurgie,* v. 48, July 1951, p. 561-566.

Method, equipment, and nine photomicrographs of Cu samples. (M21, Cu)

270-M. Effect of the Base on the Crystallization of Very Thin Gold Layers. (In French.) Antoine Colombani and Gaston Ranc. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, July 2, 1951, p. 46-48.

Deposits were made on plexiglas and on various crystals, then compared as to thickness, microstruc-

ture, and conductivity. Results are discussed. (M27, N12, Au)

271-M. (Book) Alloys of Magnesium With Aluminum and Zinc. (In Russian.) V. I. Mikaeva. 195 pages. 1946. Academy of Sciences of the U.S.S.R., Moscow and Leningrad.

Includes 82 figures—principally constitutional diagrams and their sections—in addition to 42 photomicrographs and 13 tables of experimental data. Bibliography of 77 references includes all work by German, English and American investigators listed in "Metals Handbook" and in "Handbuch aller Legierungen," as well as Japanese and Russian studies. The phase boundaries are importantly modified in a number of respects from those derived from Köster's work in Germany, and reproduced in above handbooks. (M24, Al, Mg, Zn)

272-M. (Book) Molecular Physics. (In Russian.) E. A. Strauf. 576 pages. 1949. State Publishing House for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

Text for advanced technical students covers elementary physics, kinetics, mechanics, thermodynamics, atomic physics, crystallography, physics of gases, liquids and solids—also colloid chemistry. Concluding section includes phase diagrams, certain constutional features of alloys, and a brief treatment of "dislocations" and "holes" in solid lattices are presented. (M general, N general)

273-M. (Book) Practical Microscopy. L. C. Martin and B. K. Johnson. 124 pages. 1950. Chemical Publishing Co., 26 Court St., Brooklyn 2, N. Y. $2.50.

Optical principles and physical limitations of the microscope. Theory is kept at a minimum and the text is slanted toward the practical man and the student. Includes 89 illustrations. (M21)

274-M. (Book) The Structure and Mechanical Properties of Metals. Bruce Chalmers. 132 pages. 1951. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. $3.50.

Object of this monograph is to provide the simplest possible picture of the structure of metals and alloys and its relation to the mechanical properties. In avoiding mathematical considerations, the author has necessarily glossed over many of the finer points and has had to be content with a rather superficial approach to some aspects of the subject. (M27, Q general)

275-M. Studies on Tellurium-Selenium Alloys. E. Grison. *Journal of Chemical Physics,* v. 19, Sept. 1951, p. 1109-1113.

Te and metallic Se were shown to give solid solutions in any concentration. Variation of the cell dimensions with composition departs only slightly from linearity. The presence of sharp lines in all the alloys suggests that these must be composed not of homogeneous chains but of composite chains, in which the homogeneous sequences must be fairly short. (M26, Ti, Se)

276-M. A Simple Method of X-Ray Microscopy and its Application to the Study of Deformed Metals, R. W. K. Honeycombe. *Journal of the Institute of Metals,* v. 19, Sept. 1951, p. 39-44.

A method of obtaining images from metal crystals, using a line source of characteristic X-rays. The images can be enlarged to at least 50 diameters to reveal significant microscopic phenomena, in particular distortions arising from slight plastic deformation which are not readily observed by optical micrography. Scope of the method is illustrated by a series of X-ray and optical micrographs. (M23)

277-M. Crystal Structures of AzZnAs and NaZnAs. (In German.) N. Nowotny and B. Glatzl. *Monatshefte fur Chemie,* v. 82, No. 4, 1951, p. 720-722.

The above stoichiometrically composed alloys were investigated and found to have a fluorspar structure. Lattice constants are presented and discussed. (M26, Ag, Na, Zn, As)

278-M. Identification and Mode of Formation and Re-Solution of Sigma Phase in Austenitic Chromium-Nickel Steels. E. J. Dulis and G. V. Smith. *American Society for Testing Materials,* "Symposium on the Nature, Occurrence, and Effects of Sigma Phase," 1951, p. 3-29; disc., p. 30-37.

Previously abstracted from *American Society for Testing Materials,* Preprint 50, 1950. See item 211-M, 1950. (M26, N8, SS)

279-M. X-Ray Study of the Sigma Phase in Various Alloy Systems. Pol Duwez and Spencer R. Baen. *American Society for Testing Materials,* "Symposium on the Nature, Occurrence, and Effects of Sigma Phase," 1951, p. 48-54; disc., p. 55-60.

Previously abstracted from *American Society for Testing Materials,* Preprint 47, 1950. See item 210-M, 1950. (M26, Fe, Co, Ni, Cr, V)

280-M. Sigma Phase in Chromium-Molybdenum Alloys with Iron or Nickel. John W. Putman, N. J. Grant, and D. S. Bloom. *American Society for*

Testing Materials, "Symposium on the Nature, Occurrence, and Effects of Sigma Phase," 1951, p. 61-68; disc., p. 69-70.

Formation of sigma in a simple alloy of Cr, Mo, and Fe. The extent of the sigma phase in the Cr-Mo-Fe ternary diagram was determined, and some of the properties of the sigma occurring in this system are described. X-ray diffraction data on Cr-Mo-Ni sigma are included. (M27, N6, SS)

281-M. The Tetragonality of the Sigma Phase in the Iron-Chromium System. L. Menezes, J. K. Roros, and T. A. Read. *American Society for Testing Materials,* "Symposium on the Nature, Occurrence, and Effects of Sigma Phase," 1951, p. 71-74; disc., p. 74.

Preparation of single-crystal specimens of the 50% Fe, 50% Cr sigma phase by isothermal transformation of coarse-grained ferrite of this composition at 775° C. (M26, SS)

282-M. Sigma Phase and Other Effects of Prolonged Heating at Elevated Temperatures on 25 Per Cent Chromium-20 Per Cent Nickel Steel. G. N. Emmanuel. *American Society for Testing Materials,* "Symposium on the Nature, Occurrence, and Effects of Sigma Phase," 1951, p. 82-99; disc., p. 120-121.

Previously abstracted from *American Society for Testing Materials,* Preprint 52, 1950. See item 212-M, 1950. (M26, N3, Q general, SS))

283-M. The Occurrence of the Sigma and Its Effect on Certain Properties of Cast Fe-Ni-Cr Alloys. J. H. Jackson. *American Society for Testing Materials,* "Symposium on the Nature, Occurrence, and Effects of Sigma Phase," 1951, p. 100-119; disc., p. 120-127.

These alloys are used for heat resistant castings and particular discussion is given of the HF (cast 26% Cr, 12% Ni) and the HK (cast 26% Cr, 20% Ni) alloys. Mechanical properties and microstructures are emphasized. 13 ref. (M27, Q general, SS)

284-M. Correlation of Structure and Test-Bar Properties of 85-5-5-5 Alloy. (Continued.) L. W. Eastwood and J. G. Kura. *Foundry,* v. 79, Oct. 1951, p. 120-124, 226-230.

Results of an investigation show that the structural features (other than the Cu-Sn-Zn matrix) which mainly appear to determine the tensile properties of 85-5-5-5 alloy are quantity, shape and size of the voids constituting microporosity, the size and shape of the lead particles, and the occurrence of localized shrinkage. Microradiographs are shown. (M27, E25, Cu)

285-M. Intermediate Phases in Ternary Alloy Systems of Transition Elements. Sheldon Rideout, W. D. Manly, E. L. Kamen, B. S. Lement, and Paul A. Beck. *Journal of Metals,* v. 3, Oct. 1951. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 872-876.

The 1200° C. isothermal sections of the following ternary phase diagrams were investigated: Cr-Co-Ni, Cr-Co-Fe, Cr-Co-Mo, and Cr-Ni-Mo. In all these systems, the σ phase was found to form extended solid solutions. Two new ternary phases of unknown structure were identified. 13 ref. (M24, AY)

286-M. Systems Titanium-Molybdenum and Titanium-Columbium. M. Hansen, E. L. Kamen, H. D. Kessler, and D. J. McPherson. *Journal of Metals,* v. 3, Oct. 1951. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 881-888.

The highly reactive Ti-Mo and Ti-Cb alloys were prepared and heat treated under protective conditions. Phase diagrams were established based on micrographic and X-ray diffraction analysis and detection of incipient melting. β-Ti forms a continuous series of solid solutions with both Mo and Cb, whereas these metals are only slightly soluble in the α-Ti modification. 14 ref. (M24, Ti, Mo, Cb)

287-M. Solubility Relationships in Some of the Ternary Systems of Refractory Monocarbides. John T. Norton and A. L. Mowry. *Journal of Metals,* v. 3, Oct. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 923-925.

Isothermal sections of the pseudo-ternary carbide systems TiC-VC-ZrC, TaC-VC-ZrC and NbC-VC-ZrC were examined. Isoparametric lines were determined which show the curvature of the single-phase field and the direction of tie lines in the two-phase field. Phase diagrams are given. (M24, C-n)

288-M. Structure of Electrolytically Separated Martensite. *Metal Progress,* v. 60, Sept. 1951, p. 136. (Translated and condensed from "Structure of Martensite Separated Electrolytically From Quenched Steel," M. P. Arbuzov.

Previously abstracted from *Doklady Akademii Nauk SSSR,* [Reports of the Academy of Sciences of the USSR.] See item 9-M, 1951. (M26, ST)

289-M. Intense Gallium X-Rays for Microradiography and Diffraction Investigations. A. Taylor. *Nature,* v. 168, Sept. 15, 1951, p. 471-472.

Intense gallium X-rays provide the only radiation capable of discriminating satisfactorily between Cu and Zn-rich segregates. (M22, M23, Cu, Zn)

290-M. Factors Affecting the Solubility of Carbon in Iron. R. V. Riley. *Foundry Trade Journal,* v. 91, Sept. 20, 1951, p. 331-339; Sept. 27, 1951, p. 363-368; disc., p. 368-371.

Experiments were carried out in laboratory cupola furnaces in which carefully controlled conditions were maintained. C solubility in Fe was determined in selected atmospheres of H_2, O_2, N_2, and air, at normal and low temperatures, and in vacuo. It is shown that available knowledge on the form of the liquidus of Fe-C alloys containing over 4.5% is incomplete. Metallographic examinations were made showing the effects of various conditions on structure. 41 ref. (M24, N12, E10, CI)

291-M. Carbide Phase in Tempered Steel. K. H. Jack. *Metal Progress,* v. 60, Oct. 1951, p. 11.

Work of the author in comparison with that of M. P. Arbuzov in the USSR, indicating areas of agreement and disagreement. (M27, J29, ST)

292-M. The Ternary Aluminum-Iron-Silicon System. (In German.) H. Nowotny, K. Komarck, and J. Kromer. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben,* v. 96, Aug. 1951, p. 161-169.

X-ray, thermoanalytical, and microscopic studies of 150 alloys composed of up to 45% Fe, 30% Si, rest Al, explained several discrepancies in the results obtained by other authors. Experimental method and results. A graph shows the effect of Fe and Si on susceptibility to cracking and on length of crack. Also includes X-ray diagrams and photomicrographs. 31 ref. (M24, Al, Fe, Si)

293-M. (Book) **Symposium on the Nature, Occurrence, and Effects of Sigma Phase.** 181 pages. 1951. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. (Special Technical Publication 110.) $2.50.

In general, discusses the occurrence of sigma in the commercial types of Fe-Cr and Fe-Cr-Ni alloys in which it appears as a relatively low - temperature transformation product of a phase stable at high temperatures. Each paper is abstracted separately. (M26, N6, SS)

294-M. (Book) **Contribution a l'emploi des methodes optiques en metallographie microscopique. Application aux bronzes, aux alliages cuivre-antimoine et a une serie de siliciures.** (Contribution to Use of Optical Methods in Microscopic Metallography. Application to Bronzes, Copper-Antimony Alloys and to Series of Silicides.) Theophile Cambon. 107 pages. 1949. Service de Documentation et d'Information Technique de l'Aeronautique, 2 rue de la Port-d'Issay, Paris 15, France.

General methods such as analysis of polished surfaces, and crystallographic analysis; the techniques applied, and research on various alloys. 73 ref. (M21, Cu, Zn, Sb)

295-M. Correlation of Structure and Test-Bar Properties of 85-5-5-5 Alloy. J. G. Kura and L. W. Eastwood. *Foundry,* v. 79, Nov. 1951, p. 110-115.

Third of a series based on investigations sponsored by the Brass and Bronze Ingot Institute shows that variations in properties of 85-5-5-5 alloy test bars are a result of differences in structure. Micrographs and tabular data. (M27, Q general, Cu)

296-M. Structure of Oxide Replica for Electron Microscopy. Shigeto Yamaguchi. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1295-1296.

The oxide films formed on metals and able to reprint faithfully their surface forms are called "structureless". Shows that the "structureless" oxide film formed on the etched surface of iron single crystals is composed of oriented crystals of small size (50-100 A). (M21)

297-M. The Equilibrium Diagram of the System Nickel-Manganese. B. R. Coles and W. Hume-Rothery. *Journal of the Institute of Metals,* v. 80, Oct. 1951, p. 85-92.

The diagram above 800° C. was determined by a combination of thermal, microscopic, and X-ray methods; some information about the diagram at lower temperatures was also obtained. The diagram in some respects resembles that of the system Ni-Zn, which suggests that Mn acts as a divalent element in some of the alloys. (M24, Ni, Mn)

298-M. A New High-Resolution System of Autoradiography. Henry J. Gomberg. *Nucleonics,* v. 9, Oct. 1951, p. 28-43.

Called "wet-process autoradiography," new system of radiation detection offers one-micron resolution with simple equipment. Single-cell studies and metal grain structure are examples of tracer research for which it is suited. 12 ref. (M23)

299-M. Is Pro-Eutectoid Ferrite or Cementite Continuous With Pearlite Ferrite or With Cementite? (In Swedish.) S. Modin. *Jernkontorets Annaler,* v. 135, no. 4, 1951, p. 169-174.

Three hypo-eutectoid and one hypereutectoid steel, all with a coarse pearlite structure, were investigated microscopically. In the former steels

it was found that pro-eutectoid ferrite was often continuous with ferrite of pearlite. This does not agree with the observations of Mehl and his collaborators. It is further shown that, in the hypereutectoid steel, the pro-eutectoid cementite is not always continuous with the pearlite cementite. (M26, ST)

300-M. Influence of Grain Boundaries on the Plastic Properties of Metals. F. R. N. Nabarro. "Some Recent Developments in Rheology", United Trade Press (London), 1950, p. 38-52.

Includes a literature survey on existing viewpoints. Diagrams. 39 ref. (M27, Q24)

301-M. A Method of Exact Analysis of the Shape of Stress-Strain Curves. Application to the Role of Inter-Granular Boundaries and Impurities. (In French.) C. Crussard. "Some Recent Developments in Rheology", United Trade Press (London), 1950, p. 53-62.

Includes results of an experimental investigation. (M27, Q27)

302-M. Inorganic Replication in Electron Microscopy. C. J. Calbick. *Bell System Technical Journal*, v. 30, Oct. 1951, pt. 1, p. 798-824.

The process of evaporated film formation as it is related to properties important in microscopy. In principle, any material of suitable physical and chemical properties may be used for evaporated replica films. Micrographs of silica, Cr, gold-manganin, Al, Al-Pt-Cr, and Ge replicas. 23 ref. (M21)

303-M. Chromium-Nickel Phase Diagram. David S. Bloom and Nicholas J. Grant. *Journal of Metals*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 1009-1014.

Investigation of the Cr-Ni system revealed that there is a eutectoid transformation at about 1180° C. The transformation in Cr implied by the eutectoid reaction was detected at about 100° C. below its melting point. Associated with the eutectoid transformation, a metastable transition structure was found. Phase diagrams and micrographs. (M24, Cr, Ni)

304-M. Metallographic Techniques for Austenite Grain Size of Steels in the As-Cast State. Edward A. Loria. *Journal of Metals*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 1029-1030.

In steels exhibiting temper brittleness, it has been found that addition of the wetting agent, Zephiran chloride, to a modified picral etch reveals a precipitate not shown by other etching reagents. Best results were obtained by use of 1% Zephiran chloride in 6% nital. Results are illustrated by macrographs. (M28, CI)

305-M. Transitions in Chromium. *Journal of Metals*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 1066-1067.

Discussion of above paper (by M. E. Fine, E. S. Greiner, and W. C. Ellis). (Jan. 1951 issue. See item 16-M, 1951.)
(M26, P10, P11, P15, Q21, Cr)

306-M. Atomic Relationships in the Cubic Twinned State. *Journal of Metals*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 1070-1074.

Discussion of above paper (by W. C. Ellis and R. G. Treuting). (Jan. 1951 issue, see item 15-M, 1951.)
(M26)

307-M. Effect of Strain Hardening and Tempering on 18/8 Stainless Steels. P. Bastien, J. Dedieu and A. Portevin. *Metal Treatment and Drop Forging*, v. 18, Oct. 1951, p. 465-468.

Metallographic technique using a fine suspension of the magnetic oxide of iron to differentiate between α-phase and austenite in 18-8 stainless steels and its use to study the effect of strain hardening and tempering. (M23, J29, SS)

308-M. Diffuse X-Ray Scattering by Disordered Binary Alloys. II. William J. Taylor. *Physical Review*, ser. 2, v. 84, Oct. 1, 1951, p. 148-149.

Extends mathematical analysis, presented by the same author. See item 120-M, 1951. (M22)

309-M. New Reagents for the Purpose of Revealing the Micrographic Structures of Steel by the Formation of Colored Films. (In French.) Louis Beaujard. *Compets Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, Sept. 17, 1951, p. 653-655.

An alkaline reagent of a given composition was used. The various colorations reveal the physical and chemical heterogeneity of the metal. (M23, ST)

310-M. Nonmetallic Inclusions in Ferrochromium. (In French.) R. Zoja. *Revue de Metallurgie*, v. 48, Aug. 1951, p. 631-638.

Most samples were of the following compositions: Si, 3.66%; Mn, 0.27%; Cr, 52.6-97.3%; S, 0.005-0.027%; P, 0.010-0.059%; and carbon less than 1%. Structure, isothermal transformations of typical α- and β-type inclusions, and their chemical composition were particu-

larly considered. Numerous micrographs and macrographs. (M27, M28, Fe-n)

311-M. Micrographic Etchant Designed to Show the Beginning of Intergranular Precipitation of Solid Solutions of Aluminum and Magnesium. (In French.) J. Hérenguel and M. Scheidecker. *Revue de Métallurgie,* v. 48, Sept. 1951, p. 659-664.

Experiments using two techniques: anodic oxidation; and chemical polishing in a phosphoric-sulfuric-nitric bath. The latter was of particular value for alloys containing 5% Mg. Typical results are illustrated by micrographs. (M21, Al)

312-M. The Stability of the Hexagonal Lattice Submitted to a Law of Simple Forces. (In French.) F. R. N. Nabarro and H. O. Varley. *Revue de Métallurgie,* v. 48, Sept. 1951, p. 681-683.

Theoretical discussion to decide whether the effects of the zones and of polarization would deform a formerly compact lattice, or whether the lattice has a non-compact equilibrium structure, even in the absence of these effects. Considerations are limited to central forces affecting neighboring atoms, and to "Fermi" energy, depending only on the volume. (M26)

313-M. Standards for Graphite Structures in Gray Iron. (In German.) C. W. Pfannenschmidt. *Giesserei,* v. 38 (new ser., v. 4), July 26, 1951, p. 355-359.

Includes numerous photomicrographs of different sizes and structures of graphite. (M27, E25, CI)

314-M. Investigation of Structure in the Third Dimension. (In German.) H. Klemm. *Metall,* v. 5, Aug. 1951, p. 337-341.

Mechanical and chemical erosion of polished surfaces was used in study of three-dimensional structure. Also a method for determining volume of individual constituents and average grain volume. (M27)

315-M. Metallography of the Light Metals. II. Differences in Texture Within the Cross Section of Pressed Forms. (In German.) Hans Kostron and Margarete Schippers. *Metall,* v. 5, Oct. 1951, p. 426-428.

Effect of different etches on the appearance of microstructures in an Al-Cu-Mg alloy containing 4.07% Cu and 0.6% Mg. (M21, Al)

316-M. The Structure of Copper-Silver-Indium System. I. Course of Equilibrium on the Copper-Silver Side. (In German.) Erich Gebhardt and Manfrid Dreher. *Zeitschrift für Metallkunde,* v. 42, Aug. 1951, p. 230-238.

Metallographic, thermal, and conductivity studies were made to determine the phase diagram of above system containing a maximum of 35% In. Includes constitution diagrams, photomicrographs, and tables. (M24, Cu, Ag, In)

317-M. The Gamma Phase of Manganese. I. The Effect of Additions on the Structure of Alloys Quenched From the Gamma Range to Room Temperature. (In German.) Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 42, Aug. 1951, p. 246-252.

Study on alloys of Mn with Ge, Ga, Zn, Cu, Ni, Pt, Fe, Ag, Co, As, Sb, Sn, In, Si, and Al. Constitution diagrams, tables, and graphs. 15 ref. (M24, Mn)

318-M. Constitution Diagrams of the Iron-Antimony-Sulfur and Cobalt-Antimony-Sulfur Systems. (In German.) Werner Lange and Heinz Schlegel. *Zeitschrift für Metallkunde,* v. 42, Sept. 1951, p. 257-268.

Experimental procedure, the alloys being studied by thermal, microscopic, and X-ray analysis. Tables, graphs, and photomicrographs. 15 ref. (M24, Fe, Co, Sb)

319-M. Research on the Manganese-Nitrogen System. (In German.) Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 42, Sept. 1951, p. 274-276.

Experiments on the phase diagram of the Mn-Ni system. Properties and microstructure of various compositions in the system. Includes phase diagram, photomicrographs, and tables. (M24, Mn, N)

320-M. Micro-X-Ray Investigation of the Distribution of Alloying Elements in Nickel Solid Solutions. (In Russian.) K. A. Osipov and S. G. Fedotov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 78, May 1, 1951. p. 51-53.

X-ray micrographic investigation of Ni-W, Ni-Mo, Ni-Cb, Ni-Ti, and Ti-Ta alloys showed that significant inhomogeneity in the distribution of components is retained in the grains of the single-phase solid solution containing 5 at. % of the alloying elements after protracted heating at 950 and 1100° C. (M23, Ni)

321-M. A Recording Dilatometer for High Temperatures. W. R. Apblett and W. S. Pellini. *American Society for Metals,* Preprint 2W, 1951, 15 pages.

A novel method permits extension of dilatometry to temperatures considerably in excess of the present practical limits of 1800° F., with concomitant flexibility of heating rate. The method consists of electrical resistance heating of a small rod-like specimen. Temperatures and resulting dilations are recorded by

means of thermocouples and SR-4 clip gages, respectively. Heating rates of 500° F. per sec. are readily attainable. Data are presented for the linear expansion of various high-temperature alloys to 2400° F., Mo to 3000° F., and W to 4760° F. Applicability to transformation studies over a wide range of temperatures is demonstrated.
(M23, P11, Mo, W, SG-h)

322-M. The Structure of $ZrMo_2$. Pol Duwez and Charles B. Jordan. *Journal of the American Chemical Society,* v. 73, Nov. 1951, p. 5509.

Preparation procedure and powder-pattern measurements. Calculated relative intensities were found to be in very good agreement with those estimated visually from powder patterns. Proposes that the intermediate phase in the Zr-Mo system has the ideal stoichiometric composition $ZrMo_3$.
(M24, M26, Zr, Mo)

323-M. Electropolishing of Metallographic Specimens. (In Dutch.) J. W. Holleman and W. A. Schultze. *Metalen,* v. 6, Aug. 31, 1951, p. 306-311.

Surveys current theories. Development of an electrolyte with good polishing features and satisfactory throwing power. The principle of a jet of liquid, spurting from the cathodic nozzle against the specimen was successfully used for polishing of nitrided cases and other diffusion layers. A time-saving unit was designed for polishing the entire surface of a $\frac{5}{8}$-in. micrograph. (M21)

324-M. A Simple Method of Preparing Large Areas of Transparent Films of Aluminum Oxide Ranging in Thickness from 50 to 300 Mu. (In German.) Karl Strohmaier. *Zeitschrift für Naturforschung,* v. 6a, Sept. 1951, p. 508-509.

Procedure for use as replicas in electron microscopy. (M21)

325-M. Index of Refraction of Thin Al_2O_3 Films. (In German.) Walter Weiskirchner. *Zeitschrift für Naturforschung,* v. 6a, Sept. 1951, p. 509-510.

Immersion method of determining index of refraction with an average accuracy of ± 0.0005. The films are used as replicas in electron microscopy. (M21, P17)

326-M. "Cube Position" of Cubic Face-Centered Metals. (In German.) E. Schmid and H. Thomas. *Zeitschrift für Physik,* v. 130, Aug. 20, 1951, p. 293-303.

Study on 50-50 Ni-Fe and Cu rolled to extremely thin bands. Diagrams, tables, and graphs. 20 ref.
(M26, Ni, Fe, Cu)

327-M. Autoradiographic Investigation of Lead Distribution in 18-8 Steel. (In Swedish.) L. G. Erwall, A. Franzen, and M. Hillert. *Jernkontorets Annaler,* v. 135, No. 6, 1951, p. 219-228.

Distribution of Pb in stainless steel containing 0.004% Pb was studied by means of autoradiography using the lead isotope $ThB(Pb^{212})$ as indicator. The autoradiographs were studied and compared with the etched steel surface at various magnifications up to 400X. The radioactive material was found to be situated in the last parts of the specimen to solidify, i.e., between the dendrites. It is, however, not uniformly distributed over these parts but occurs to a large extent grouped in isolated aggregates. (M23, SS)

328-M. (Book) **Der metallische Zustand.** (The Metallic State.) Johannes Kramer. 147 pages. 1950. Vandenhoeck and Ruprecht, Göttingen, Germany.

Results of a decade of basic research. The metallic state is discussed from the point of view of the nonmetallic phase which is defined as the phase of a metal which lacks certain properties (such as conductivity) which usually are characteristic of metals. An entirely new method of releasing electrons from metals using the energy of exothermic processes in the metals, which appears to be a sensitive, yet simple, method of observing transformations, for detecting deviations from the most stable state of the metal, and for determining effects of working, deformation, wear, and stress. Investigations were made using Geiger counters on various ferrous and nonferrous metals and alloys. 47 ref.
(M general, N general)

SECTION N

TRANSFORMATIONS and RESULTING STRUCTURES

1-N. Diffusion of Chromium in α Cobalt-Chromium Solid Solutions. John W. Weeton. *National Advisory Committee for Aeronautics,* Technical Note 2218, Nov. 1950, 42 pages.

Investigated for 0 to 40 atomic % Cr at temperatures of 1360, 1300, 1150, and 1000° C. 11 ref. (N1, Co, Cr)

2-N. Radioactive Sodium as a Metallurgical Tracer. *Metal Progress,* v. 58, Dec. 1950, p. 902, 904.

See abstract of "Modification in Aluminium-Silicon Alloys", B. M. Thall and Bruce Chalmers, *Journal of the Institute of Metals,* item 17-N, 1950. (N12, S19, Al, Si)

3-N. Grain Boundaries and Sintering. A. P. Greenough. *Nature,* v. 166, Nov. 25, 1950, p. 904-905.

Some experiments carried out on specimens cut from cold-rolled, high-purity Ag sheet containing a number of uniformly distributed blowholes. A flat, electropolished surface was prepared on each specimen, which was then annealed in O_2-free N_2. In the annealed specimens, most of the blowholes lay in the planes of the grain boundaries, and the large number of small blowholes in the original material had been replaced by a smaller number of larger holes of nearly uniform size. Possible mechanisms involved. (N3, Ag)

4-N. Crystallographic Study of Structural Precipitation in Duralumin. (In French.) H. Lambot. *Revue de Métallurgie,* v. 47, Oct. 1950, p. 709-726.

The unusual X-ray diffraction patterns of complex Al alloys during their structural hardening were investigated. These are shown to indicate the presence of disordered phases prior to true precipitation. Three types of duralumin were investigated. Diffraction patterns illustrate results. 21 ref. (N7, Al)

5-N. The Physics of Metals. Diffusion and Interaction of Impurities and of Structural Defects in Metals. (In French.) C. Crussard. *Metaux & Corrosion,* v. 25, Sept. 1950, p. 203-226.

A theoretical investigation. Existence of two types of defects is assumed, those caused by presence of foreign atoms and those caused by regions of lower-than-average density. The influence of "diffusion" of both of these types on crystal structure and mechanism of diffusion is analyzed and explained. Formulas for calculation of energy of interaction for the case of diffusion are proposed. 20 ref. (N1)

6-N. Experimental Study of the Phenomenon of Diffusion. (In French.) A. Guinier. *Métaux & Corrosion,* v. 25, Sept. 1950, p. 227-236.

Coefficient of diffusion and experimental methods for its determination were investigated. Despite the fact that such determinations are very difficult, complicated, and not precise, it was possible to verify the equation of Fick for many cases of diffusion of gases and metals into metals. Methods of investigation and interpretation of data. 18 ref. (N1)

7-N. Reactions Induced by Strain Hardening and Annealing in 18-8 Low-Carbon Steels. (In French.) Paul Bastien and Jacques Dedieu. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Oct. 23, 1950, p. 862-864.

Proportion of α-phase formed upon cold drawing of stainless steels containing 0.035% C and 4-12% Ni, by magnetic and X-ray methods. Importance of the effect of Ni, which hinders formation of α-phase. (N6, SS)

8-N. Isothermal Transformations of the Characteristic Inclusions in Ferrochromiums. (In Italian.) Raffaello Zoja. *Metallurgia Italiana,* v. 42, Aug.-Sept. 1950, p. 321-325.

Results of a study at 800, 900,

1100, and 1300° C. are illustrated by photomacrographs. Concludes that 95% of the inclusions are composed of the two basic constituents —α and β. The first is high in SiO_2; the second in CrO_3; other constituents are derived from these by reduction with H_2 or Si. (N6, Fe-n, Cr)

9-N. Formation of a Fine Structure in Aging of Aluminum Alloys. (In Russian.) N. N. Buinov and R. M. Lerinman. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 11, 1950, p. 929-931.

Investigated by the electron microscope for saturated solid solutions of Al-Cu (4% Cu), Al-Ag (10% Ag), and Al-Mg-Si (14% Mg_2Si) alloys at 150-200° C. and above. Influence of annealing temperature on fineness of structure is revealed by a series of electron micrographs. (N7, Al)

10-N. Temperature Dependence of the Stability of Supercooled Phases. (In Russian.) N. N. Sirota. *Doklady Akademii Nauk SSSR*, (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 11, 1950, p. 971-974.

Theoretically investigated for the isothermal transformations. Formulas for determination of the dependence are proposed and curves of stability vs. degree of super-cooling are plotted on the basis of these formulas for carbon steel. Comparison of experimental and calculated data show close agreement. (N8, CN)

11-N. Influence of Concentration Stresses on the Rate of Lateral Growth of Pearlite Grains. (In Russian.) L. N. Aleksandrov and B. Ya. Lyubov. *Doklady Akademii Nauk, SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 21, 1950, p. 1081-1084.

The above problem was theoretically investigated assuming that "concentration stresses" are phenomena caused by heterogeneous distribution of concentration of the dissolved component, resulting in additional diffusion flow. Formulas are proposed describing this influence. These formulas are interpreted for different values of the variables. (N3, ST)

12-N. Two Types of S-Curves of Stability of Supercooled Phases (In Russian.) N. N. Sirota. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 21, 1950, p. 1105-1108.

Experimental investigation of the stability of supercooled austenite from carbon and alloy steels shows that variation with temperature of stability—characterized by time of transformation under isothermal conditions at subcritical temperatures—may be described by two S-curves designated as "normal" and "complex." Causes of the existence of these two curves are indicated for single-component and multi-component systems. As an example, an S-curve of stability of supercooled austenite from a Cr steel (1% C and 3% Cr) is analyzed. Data are charted. (N8, ST)

13-N. Electrical Conductivity Method for Measuring Self-Diffusion of Metals. J. H. Dedrick and G. C. Kuczynski. *Journal of Applied Physics,* v. 21, Dec. 1950, p. 1224-1225.

Proposes method in which contact conductance of an interface between two metallic spheres or hemispheres is measured. (N1)

14-N. Coefficient of Self-Diffusion of Copper. G. Cohen and G. C. Kuczynski. *Journal of Applied Physics,* v. 21, Dec. 1950, p. 1339-1340.

Results of measurement of the above are charted and tabulated for a range of temperatures. (N1, Cu)

15-N. The Superstructure in the α-Phase of Silver-Magnesium Alloys. L. M. Clarebrough and J. F. Nicholas. *Australian Journal of Scientific Research,* v. 3, ser. A, June 1950, p. 284-289.

X-ray and electrical resistivity studies of an Ag-Mg alloy containing 25 atomic % Mg. It is concluded that a superlattice exists at this composition, the order-disorder transformation occurring between 386 and 389° C. (N10, P15, Ag, Mg)

16-N. Diffusion of Copper Along the Grain Boundaries of Nickel. R. S. Barnes. *Nature,* v. 166, Dec. 16, 1950, p. 1032-1033.

Experimental evidence showing that Cu diffuses preferentially along the grain boundaries of Ni. Thin Cu and Ni strips of commercial purity, stacked alternately, were annealed in an atmosphere of hydrogen to remove the surface oxide films, and then hot rolled together. This treatment gave very good bonding between the two metals, and no flaws could be seen microscopically in the interfaces. (N1, Cu, Ni)

17-N. Iron-Nickel Alloys; The $\alpha \rightarrow \gamma$ and $\gamma \rightarrow \alpha$ Transformations. N. P. Allen and C. C. Earley. *Iron and Steel,* v. 23, Nov. 28, 1950, p. 455-458; disc., p. 476-477.

Results of study, illustrated by graphs and photomicrographs. (N8, Fe, Ni)

18-N. Austenite; Acceleration of the Rate of Isothermal Transformation. M. D. Jepson and F. C. Thompson, *Iron and Steel*, v. 23, Nov. 28, 1950, p. 458-461; disc., 477-478.

Effects of temperature oscillation and of stress on rate were studied using two carbon steels. Data and microstructures obtained. (N8, CN)

19-N. Austenite; Breakdown Below the M_s Temperature. F. C. Thompson and M. D. Jepson. *Iron and Steel*, v. 23, Nov. 28, 1950, p. 462-466; disc., p. 477-478.

(N8, ST)

20-N. En Steels; Discussion on Atlas of Isothermal Transformation Diagrams. *Iron and Steel*, v. 23, Nov. 28, 1950, p. 473-476.

Discusses Atlas issued in June 1949 as Special Report No. 40 of the Iron and Steel Institute. (N8, AY)

21-N. Supersaturated Mixed Crystals From the Melt. (In German.) Wilhelm Hofmann. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft*, v. 1, No. 1, 1949, p. 83-88.

According to the equilibrium diagram, 1.85% Mn will dissolve in solid Al at the eutectic temperature. However, by quenching the molten alloys, a high degree of supersaturation can be achieved. By pouring into a key-shaped Cu mold, cooling by liquid air, and evacuating, 7.6% Mn was put into solid solution. X-ray diagrams show that concentration differences within these highly supersaturated mixed crystals are smaller than expected. A survey of similar phenomena in other systems and in technical alloys. (N12, Al, Mn)

22-N. Movement of Gold and Palladium Atoms Along the Surface of Crystals of Zinc Oxide. (In Russian.) A. B. Shekhter, A. I. Echeistova, and I. I. Tretyakov. *Izvestia Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of USSR), Section of Chemical Sciences, Sept.-Oct. 1950, p. 465-468.

The structure of layers of Au and Pd, applied in vacuum on crystals of ZnO, was investigated by use of the electron microscope. Effects of heating were determined. It was found that the temperatures of initiation of extensive motion of atoms are located close to their melting points. (N1, M26, Au, Pd)

23-N. Continuous Transition Between Tetragonal and Cubic Forms of Alloys of Indium with Thallium. (In Russian.) E. S. Makarov. *Izvestia Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of USSR), Section of Chemical Sciences, Sept.-Oct. 1950, p. 485-491.

Detailed X-ray investigation of the crystal structure of solid solutions of In with Tl showed that, with increasing content of Tl, a continuous transformation of the face-centered tetragonal lattice of In into the face-centered cubic lattice of the alloy In_3Tl, which has a disordered structure, takes place. Experimental method and results. (N6, In, Tl)

24-N. Solubility of Nitrogen in Molten Chromium and Alloys of Chromium and Silicon. (In Russian.) V. S. Mozgovoi and A. M. Samarin. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Oct. 1950, p. 1529-1536.

See abstract of condensed version under similar title from *Doklady Akademii Nauk SSSR*, item 278-N, 1950. (N12, Cr, Si)

25-N. Thermodynamical Meaning of the Martensitic Cnanges in Steels and in Other Alloys. (In English.) Keizo Iwasé and Sakae Takeuchi. *Japan Science Review*, ser. 1, v. 1, Mar. 1949, p. 190-199.

Summarizes results of several Japanese papers which indicate that lattice changes like martensite formation are not characteristic of steel only, but occur generally in alloys whose equilibrium diagrams are of a particular type. (N8, N9)

26-N. An Investigation on Isothermal Transformation in Steels. I. The Cause of Modification of S-Curves of Some Alloy Steels. (In English.) Takejiro Murakami and Yunoshin Imai. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 1, Aug. 1949, p. 87-92.

Several alloy steel specimens containing various percentages of Cr, W, Mo, V, Ti, Al, Sn, or Co were prepared and their S-curves determined by dilatometric and microscopic methods. Causes of modification were studied by magnetic and X-ray analysis. Results and conclusions. (N8, AY)

27-N. Decarburized Structures of Steels. (In English.) Keizo Iwasé and Tokuhiko Mochida. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 1, Aug. 1949, p. 93-94.

Certain conclusions were deduced from some experiments on transformations accompanying formation of decarburized structures. Recommendations for avoidance of brittleness during heat treatment of plain carbon steel. (N8, J26, CN)

28-N. Plastic Deformation and Diffusionless Phase Changes in Metals—The Gold-Cadmium Beta Phase. L. C.

Chang and T. A. Read. *Journal of Metals,* v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 47-52.

Diffusionless transformation in Au-Cd single crystals containing about 50 atomic % Cd was investigated by means of X-ray analysis of orientation relationships, electrical resistivity measurements, and motion-picture studies of movement of boundaries between new and old phases during transformation. The nucleation of diffusionless transformation by imperfections and the generation of imperfections by diffusionless transformation. 13 ref. (N2, N6, Au, Cd)

29-N. Diffusion of Gases in Metals. Case of the Iron-Hydrogen System. (In French.) Paul Bastien. *Métaux & Corrosion,* v. 25, Oct. 1950, p. 248-262.

A comprehensive theoretical review. Analyzes the adsorption of gas by metals, diffusion of gas into metals, permeability of Fe toward hydrogen, and solubility of gases in metals. 46 ref. (N1, P13, Fe, EG-m)

30-N. Electron-Defraction Study of Cementation of Iron by Carbon Monoxide. (In French.) Jean-Jacques Trillat and Shigueo Oketani. *Métaux & Corrosion,* v. 25, Oct. 1950, p. 263-264.

See abstract under similar title from *Comptes Rendus* (France), item 184-N, 1950. (N8, J28, Fe)

31-N. Transformation Behavior and Hardness Retention of Steels Containing Special Carbide-Forming Alloying Elements, Illustrated by Vanadium Steel as an Example. (In German.) Franz Wever, Adolf Rose, and Walter Peter. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 367-379; disc., p. 379-380.

A comprehensive study, using a vanadium steel containing 0.37% C and 2.2% V, and C-V ratio being such that, at equilibrium, all carbon is combined with V in the form of V_4C_3. Results are summarized in graphs, tables, photomicrographs, and X-ray diffraction patterns. (N8, Q29, AY)

32-N. Observations on the Transformations of Iron and Its Alloys. (In German.) Eduard Houdremont. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 413-422.

Critical correlated review of the literature. Relationships of influence of various elements on the A_3 transformation of Fe to position in the periodic table. 81 ref. (N8, Fe, ST)

33-N. Effect of Alloying Additions on Hydrogen Diffusion Into Iron and a Contribution to Knowledge Concerning the Iron-Hydrogen System. (In German.) Werner Geller and Tak-Ho Sun. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 423-430.

Results of experiments made with pure iron and five different steels to study effects of composition and temperature on hydrogen diffusion. Fe-H constitution diagrams are presented. 33 ref. (N1, M24, Fe)

34-N. The $\beta \rightleftarrows \alpha$ Transformation of Tin; Isomorphism of Gray Tin. (In Russian.) N. A. Goryunova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Nov. 1, 1950, p. 51-54.

The above transformation was investigated, particularly the addition of elements which promote it. Data indicate that such elements are very close to each other and to tin in their atomic radii and lattice parameters. Possible practical applications of the results (for example, for storage of pure metallic tin). (N6, Sn)

35-N. Aging of Aluminium Alloys; Recent Russian Work. *Chemical Age,* v. 64, Jan. 6, 1951, p. 25-28.

Reviews recent work of Buinov and Lerinman. Work of other investigators in Russia and elsewhere. 12 ref. (N7, Al)

36-N. Process of Nucleation in Solid Solutions. (In French.) Pierre Laurent. *Revue de Métallurgie,* v. 47, Nov. 1950, p. 835-842.

A theoretical analysis on the basis of the literature. 20 ref. (N2)

37-N. An Immediate Cause of Flake Formation. (In French.) J. G. Platon. *Revue de Métallurgie,* v. 47, Nov. 1950, p. 857-862; disc., p. 862.

Experimental investigations seem to indicate that the influence of hydrogen is not the main cause and that several other factors are involved in the formation of flakes in steel. (N12, ST)

38-N. The Decomposition Structure of Magnesium-Rich Magnesium-Aluminum Solid Solutions. (In German.) *Zeitschrift für Metallkunde,* v. 41, Oct. 1950, p. 332-334.

Experimental studies were made to determine why supersaturated Mg-Al solid solutions sometimes decompose into "eutectoids" and sometimes into "oriented segregates". Heat treating experiments were made with specimens of 4, 7, and 12% Al, non-homogenized and homogenized 1, 2, 4, 8, and 14 days at 420° C. (N7, Mg)

39-N. Age Hardening. L. F. Mondolfo. *Journal of Metals,* v. 191, Feb. 1951, p. 95.

Research in progress on several nonferrous alloy systems. Investigation by hardness and electrolytic potential measurements. Results indicate that there are at least two types of age hardening, depending on complexity of the transformation required to form the lattice of the precipitate from the lattice of the solid solution. (N7, EG-a)

40-N. Diffusion Phenomena Occurring During Sintering. Ben H. Alexander. *Journal of Metals,* v. 191, Feb. 1951, p. 95.

Research in progress. The systems being studied are: Ag-Cu, Cu-Ni, Ag-Au, Cu-Fe, Cu-Zn, Ag-Ni, Cu-W, Ag-Zn, and Au-Ni. They were chosen to give a wide range of mutual solubilities and consequently greatly differing amounts of diffusion upon sintering of copper compacts. (N1, H15, Cu)

41-N. "Oriented Growth" in Primary Recrystallization. Joseph J. Becker. *Journal of Metals,* v. 191, Feb. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 115.

Certain points to be considered before the oriented-growth hypothesis is applied to primary recrystallization, with necessary complete divorce of the mechanism of recrystallization from details of the deformation process. (N5)

42-N. Cobalt Self-Diffusion: A Study of the Method of Decrease in Surface Activity. R. C. Ruder and C. E. Birchenall. *Journal of Metals,* v. 191, Feb. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951 p. 142-146.

Method was used to determine rates of diffusion of Co into Co and Ni. Effects of geometry and surface preparation. Equations for the two self-diffusion coefficients. (N1, Co, Ni)

43-N. Interface and Marker Movements in Diffusion in Solid Solutions of Metals. Luiz C. Correa da Silva and Robert F. Mehl. *Journal of Metals,* v. 191, Feb. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, p. 155-173.

An experimental study of the movement of markers in the systems Cu/α brass, Cu/Snα-solid solution, Cu/Alα-solid solution, Cu/Ni, Cu/Au, and Ag/Au, employing many types of markers and a variety of temperatures. Marker movement was confirmed. Association with the manner in which atoms move during diffusion. 19 ref. (N1, Cu, Ag, Au)

44-N. Effect of Ternary Additions on the Age-Hardening of a Copper-Silver Alloy. Harold Margolin and Walter R. Hibbard, Jr. *Journal of Metals,* v. 191, Feb. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 174-180.

Effect of ten ternary additions on aging of a Cu+5% Ag alloy was measured by X-ray and microstructural examination, and hardness testing. A supersaturated Cu-rich transition structure was found. Effect of the ternary element was related to differences between transition and precipitate lattice parameters. Analogies with solution and strain hardening. 22 ref. (N7, Cu)

45-N. On the Recrystallization and Grain Growth in Tungsten Wire. H. A. DeVincentis and J. H. Dedrick. *Sylvania Technologist,* v. 4, Jan. 1951, p. 6-8.

Important factors affecting the above with emphasis on manufacturing problems in the electron-tube and lamp industries. Several methods of controlling these phenomena. (N5, N3, T1, W)

46-N. The Effect of Small Quantities of Cd, In, Sn, Sb, Tl, Pb, or Bi on the Aging Characteristics of Cast and Heat-Treated Aluminium-4% Copper-0.15% Titanium Alloy. H. K. Hardy. *Journal of the Institute of Metals,* v. 78, Oct. 1950, p. 169-194.

Results of extensive experimental work and theoretical analysis. 15 ref. (N7, Al)

47-N. The Allotropy of Manganese. J. W. Christian. *Journal of the Institute of Metals,* v. 78, Oct. 1950, p. 195-202.

Free energy vs. temperature relations are calculated for the α, β and γ forms, of Mn, using existing thermodynamic data. In the case of the α and γ forms, relative free-energy curves can be drawn over the whole temperature range from 0° to 1400° K., the free energies being expressed in terms of heat content of the α phase at absolute zero. For the β phase, a free-energy curve can be constructed for the range 300-1400° K. in terms of heat content at room temperature. 10 ref. (N6, P12, Mn)

48-N. Some Observations on the α-β Transformation in Titanium. A. D. McQuillan. *Journal of the Institute of Metals,* v. 78, Nov. 1950, p. 249-257.

The transformation was studied in Ti prepared both by the van Arkel iodide process and by Mg reduction. A new method, involving observations on the changes of hydrogen equilibrium pressure with temperature in very dilute solutions of hydrogen in the metal, was used. It was found that whereas the transformation in the van Arkel material

occurs sharply at a single temperature, that in the Mg-reduced material takes place gradually over a range of some 100° C. Resistance measurements illustrate the same point. An explanation is suggested for the negative temperature coefficient of resistivity of β-Ti recently described by Greiner and Ellis. (N6, Ti)

49-N. The Transformations $\alpha \rightarrow \gamma$ and $\gamma \rightarrow \alpha$ in Iron-Rich Binary Iron-Nickel Alloys. N. P. Allen and C. C. Earley. *Journal of the Iron and Steel Institute,* v. 166, Dec. 1950, p. 281-288.

See abstract under similar title from *Iron and Steel,* item 17-N, 1951. (N8, Fe, Ni)

50-N. A Note on Silicon Distribution Between Austenite and Liquid Metal in Freezing Hypo-Eutectic Cast Iron. A. Hultgren and Olof Carlsson. *Journal of the Iron and Steel Institute,* v. 166, Dec. 1950, p. 303-304.

Silicon distribution, as shown in the Fe-Si-C equilibrium diagram of Jass, was qualitatively confirmed. Sampling was carried out using a graphite tube, and the assumption is made that no graphite eutectic is formed. (N8, M24, CI)

51-N. New Type of Graphitization of Cast Iron Cooled Through the Eutectoid Range. (In English.) Keizo Iwase and Isao Aoki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Oct. 1949, p. 139-142.

Analogy of the structure of gray cast iron and abnormal steel. Formation of free ferrite instead of the graphite eutectoid. Application of the new theory to production of blackheart malleable cast iron. (N8, CI)

52-N. On the Extention of the Nearest Neighbour Assumption in the Theory of the Superlattice and the Intermetallic Compound. (In English.) Hiroshi Sato. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Dec. 1949, p. 405-410.

The assumption is formally extended to include dependence of interaction potential energy upon degree of order and to make clear the nature and limit of this treatment. The treatment explains many characteristics of the superlattice which are not explained by the ordinary theory. The results obtained also describe well the characteristics of intermetallic compounds. Concludes that the transition from ordinary superlattice to intermetallic compound is continuous from the energy point of view. (N10)

53-N. Absorption of Nitrogen by Molten Iron Alloys. I. Study on Pure Iron. II. Study on Fe-Ni, Fe-Cr and Fe-Mn Alloys. (In English.) Tunezo Saito. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Dec. 1949, p. 411-424.

Experiments were performed between 1530 and 1750° C. Results obtained were fairly well interpreted by statistical thermodynamics based on the assumption that the structure of molten iron is quasicrystalline and that absorbed gas atoms are situated at the vacant spaces in the iron lattice. The entire range of the alloys was studied. 12 ref. (N12, Fe, Ni, Cr, Mn)

54-N. On Surface Figures of Molten Cast Iron. (In English.) Ichiro Iitaka and Kisao Abe. *Reports of the Casting Research Laboratory,* Jan. 1950, p. 1-3.

On solidification of molten cast iron, the surface in contact with the atmosphere becomes covered with an oxide film. Some cracks are formed during cooling of this film, which produces various figures. Effects of melting methods, mold materials, and shapes. Classifies the patterns observed into different types. (N12, E25, CI)

55-N. The Effects of Alloying Elements in Steel. I. Joseph K. Stone, Jr. *Industrial Heating,* v. 18, Jan. 1951, p. 50-52, 54, 56.

Fundamental principles of microstructural change in heat treatment of steel. Isothermal transformation diagrams are used to show that all such changes result from the transformation of austenite. (To be continued.) (N8, ST)

56-N. Effect of Aluminum Content on Internal Quality of a Killed Steel. V. E. Elliott and N. D. Fragasse. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 131-137; disc., p. 137-138.

Abnormal etch pattern observed in large blooms of AISI C-1070 steel. Porosity was found to be associated with grain-boundary sulfide inclusions; and the tendency for this type of inclusion to form was found to be associated with an Al addition of 1.2 lb per ton for grain-size control. A slight decrease in the amount of Al added was found to greatly lessen the occurrence and severity of the pattern developed. (N23, D2, ST)

57-N. An Introduction to the Annealing of Nodular Iron. J. E. Rehder. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 298-309; disc., p. 309-311.

Previously abstracted from preprint. See item 115-N, 1950. (N8, Q general, CI)

58-N. Subcritical Isothermal Graphitization. H. A. Schwartz, J. D. Hedberg and R. Eriksen. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 578-583; disc., p. 583.

Previously abstracted from preprint. See item 114-N, 1950. (N8, CI)

59-N. Formation of Order in the Alloy $CdMg_3$. H. Steeple and H. Lipson. *Nature,* v. 167, Jan. 20, 1951, p. 110-111.

Formation of a superlattice in $AuCu_3$ was found to be accompanied by interesting X-ray diffraction effects. Similar effects have now been found for $CdMg_3$. (N10, Cd, Mg)

60-N. Calculation of Diffusion Penetration Curves for Surface and Grain Boundary Diffusion. J. C. Fisher. *Journal of Applied Physics,* v. 22, Jan. 1951, p. 74-76.

In order to facilitate quantitative investigation of grain boundary and surface diffusion, a mathematical analysis of the problem was completed, assuming that grain-boundary diffusion is analogous to diffusion of heat along a thin copper foil imbedded in cork. Calculated diffusion-penetration relationship for grain-boundary diffusion is shown to agree with the experimentally determined grain-boundary self-diffusion of silver. (N1)

61-N. Precipitation and the Domain Structure of Alnico 5. A. H. Geisler. *Physical Review,* ser. 2, v. 81, Feb. 1, 1951, p. 478-479.

Shows that internal spontaneous fields in the domain structure of the matrix exert an important influence on the precipitation process in Alnico 5. (N7, P16, SG-n)

62-N. The Effects of Alloying Elements in Steel. II. Joseph K. Stone, Jr. *Industrial Heating,* v. 18, Feb. 1951, p. 248, 250, 252, 254, 256, 258, 260, 327.

Factors affecting austenite on continuous cooling and its relation to transformation at constant temperatures. (N8, ST)

63-N. Alloys of Al-Zn-Mg-Cu. *Metal Progress,* v. 59, Feb. 1951, p. 284, 286. (Condensed from "Recent Researches on Aluminum-Zinc-Magnesium-Copper Alloys," A. Saulnier and G. Gabane, *Revue de Métallurgie,* v. 46, Jan. 1949, p. 13-23.)

Work of other investigators and new experimental work using dilatometric and X-ray procedures. Emphasizes phase transformations and mechanical properties resulting from variations in heat treatment and composition. (N6, Q general, Al)

64-N. Changes of State. E. Scheil, O. Kubaschewski, and W. Hofmann. "The American FIAT Review of German Science. Vol. 31. General Metallurgy," 1950, p. 137-165.

A review covering physical properties and crystallization of metal melts, diffusion in metals, and transformations in the solid state. 78 ref. (N general, P general)

65-N. Plastic Deformation and Recrystallization. A Kochendörfer. "The American FIAT Review of German Science. Vol. 31. General Metallurgy," 1950, p. 166-194.

A general review. 106 ref. (N5, Q24)

66-N. The Permeability of Zirconium to Hydrogen. Richard B. Bernstein and Daniel Cubicciotti. *Journal of Physical and Colloid Chemistry,* v. 55, Feb. 1951, p. 238-248.

Experimental apparatus and procedure. Effects of various factors. 12 ref. (N1, Zr)

67-N. Silicon Distribution in Freezing Hypo-Eutectic Cast Iron. A. Hultgren and O. Carlsson. *Foundry Trade Journal,* v. 90, Feb. 8, 1951, p. 151-152.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 50-N, 1951. (N8, M24, CI)

68-N. Pearlitic Malleable Cast Iron. (In French.) Jean Guillamon. *Fonderie,* Dec. 1950, p. 2301.

Two methods for production: first, transformation of blackheart malleable iron with ferritic structure by heating above the Ac_1 transformation point, followed by rapid cooling; second, heating white cast iron above the Ac_1 point for a time sufficient for decomposition of cementite, followed by rapid cooling. (N8, CI)

69-N. Thermo-Elastic Analysis of Transformations in Aluminum Bronzes (In French.) Robert Cabarat, Léon Guillet, René Le Roux, and Albert Portevin. *Comptes Rendus hebomadaires des Séances de l'Académie des Sciences,* v. 231, Dec. 18, 1950, p. 1373-1375.

Solid-state transformations of a Cu-Al alloy (11.95% Al) were studied using a special apparatus. A strong heat treatment influence was observed. (N6, Cu)

70-N. Influence of Amplitude and Rate of Plastic Deformation on Diffusion of Hydrogen in Iron and Steel. (In French.) Paul Bastien and Pierre Azou. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Jan. 3, 1951, p. 69-71.

Investigated using specimens saturated with hydrogen by 48-hr. exposure to 10% HCl + 0.01% Na_2S in water. A tensile test was ap-

plied for periods varying from 0.07 sec. to 2 hr., 20 min. In the absence of preliminary plastic deformation, hydrogen had little effect. (N1, Q24, Fe, ST)

71-N. Recrystallization of Austenite Caused by Internal Stresses (In Russian.) K. A. Malyshev, V. D. Sadovskii, and B. G. Sazonov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), new ser., v. 76, Jan. 1, 1951, p. 61-64.

Experimental investigation showed that crystallization of steel during heat treatment is a complex phenomenon consisting of phase transformation, recrystallization, and grain growth. Internal stresses formed during heating of austenite above its critical point are caused by volumetric changes taking place under such conditions. (N5, N8, ST)

72-N. Internal Adsorption of Silver in Platinum. (In Russian.) V. I. Arkharov, E. V. Samova, and T. P. Chukina. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 76, Jan. 11, 1951, p. 209-210.

A Pt + 0.5% Ag solid solution was held at 1180° C. (melting point of Ag) for 2 hr., quenched in water and treated with aqua regia. On repeating this treatment cycle up to 80 times, a product having a higher Ag content on the surface than in the interior was obtained. This fact is said to support the senior author's theory of "internal adsorption." (N1, Ag, Pt)

73-N. On the Volume Shrinkage Due to Solidification of Some Cadmium-Base Alloys. (In English.) Tomo-o Sato and Hideo Kaneko. *Technology Reports of the Tohoku University,* v. 14, No. 2, 1950, p. 30-44.

Shrinkage of Cd and many Cd-base alloys, such as Cd-Ni, Cd-Ag, Cd-Cu, Cd-Hg, Cd-Ag-Cu, Cd-Ni-Hg, Cd-Ni-Cu and Cd-Hg-Cu, and relations between volume shrinkage and composition, were studied. 11 ref. (N12, Cd)

74-N. Studies on Selenium and Its Alloys. Report I. Physical Properties of Selenium. (In English.) Tomo-o Sato and Hideo Kaneko. *Technology Reports of the Tohoku University,* v. 14, No. 2, 1950, p. 45-54.

Phase transformations of Se. Rate of crystallization and heat of crystallization were determined, also a number of physical properties. Dependence of electrical resistance upon conditions of heat treatment and upon temperature. 16 ref. (N6, P15, Se)

75-N. Microscopic Observation of the Solidification of Cu-Ni Alloy Droplets. R. E. Cech and D. Turnbull. *Journal of Metals,* v. 3, Mar. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 242-243.

The solidification behavior of Cu-Ni alloy droplets containing 88.93, 80.62, and 72.27% Cu was studied as a function of composition by means of a high-temperature microscopic technique. (N12, Cu)

76-N. Surface Diffusion in Sintering of Spheres on Planes. P. Schwed. *Journal of Metals,* v. 3, Mar. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 245-246.

Mathematical analysis without restriction on region of diffusion. This procedure is different from that of Cabrera, who assumed that diffusion occurs only in the region outside the neck. (N1, H15)

77-N. Re-Solution of Precipitated Silver in Copper-Silver Alloys. Harold Margolin and Walter R. Hibbard, Jr. *Journal of Metals,* v. 3, Mar. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 247.

X-ray investigation revealed formation of a "discontinuous" type of solution on aging a Cu + 5% Ag alloy, first at 550, then at 600° C. Two sets of Cu-base lines, corresponding to the two temperatures, were observed. A possible mechanism is suggested. (N7, Cu)

78-N. Electron-Diffraction Study of the Order-Disorder Transformation of the Alloy $AuCu_3$. (In French.) H. Raether. *Acta Crystallographica,* v. 4, Jan. 1951, p. 70-71.

12 ref. (N10, M22, Au, Cu)

79-N. Low-Temperature Instability of Intermetallic Phases. (In English.) O. J. Kleppa and Donald F. Clifton. *Acta Crystallographica,* v. 4, Jan. 1951, p. 74.

An endothermic process is indicated for the phase Au_2Pb, which is formed peritectically from practically pure gold and the liquid solution at 418° C. It is expected that at lower temperatures, this compound will break down to give free Au and free Pb, or some other intermetallic phase, by a very slow diffusion transformation. However, a suitable combination of cold work and temperature should speed the decomposition. Work which indicates validity of theoretical predictions. (N9, Au, Pb)

80-N. Three New Polymorphs of Silicon Carbide, 8H, 75R, and 84R. (In English.) L. S. Ramsdell and J. A. Kohn. *Acta Crystallographica,* v. 4, Jan. 1951, p. 75.

(N6, C-n, Si)

81-N. On the Rate of Order-Disorder Transformation in β-Brass. (In English.) Yutaka Takagi, Takehiko Oguchi, and Gen Shirane. *Japan Science Review*, v. 1, Sept. 1950, p. 65-70.

Theoretical, mathematical analysis. Includes graphical interpretation. (N10, Cu)

82-N. Studies of the Fischer-Tropsch Synthesis. IX. Phase Changes of Iron Catalysts in the Synthesis. Robert B. Anderson, L. J. E. Hofer, Ernst M. Cohn, and Bernard Seligman. *Journal of the American Chemical Society*, v. 73, Mar. 1951, p. 944-946.

Studied using a 50-50 H_2-CO mixture at 7.8 atm. In the first few days of the synthesis, α-iron was converted to Hägg carbide (Fe_2C). The iron as Hägg carbide increased to a maximum of 29% at 200 hr. of synthesis, and then decreased slowly throughout the remainder of the test. Magnetite was formed at a slower rate than Hägg carbide, apparently chiefly at the expense of the α-iron phase. The magnetite phase increased throughout the experiment. 12 ref. (N8, Fe)

83-N. Titanium-Boron Alloys. H. R. Ogden and R. I. Jaffee. *Journal of Mteals*, v. 3, Apr. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, p. 335-336.

Recent work by Ehrlich and by Craighead, Simmons, and Eastwood is in conflict with regard to the solubility of B in Ti. Some new work indicates that the solubility of B in both α and β Ti is probably well below 0.4% B, and that B has no observable effect on the transition temperature of Ti. The hexagonal close-packed structure of the second phase indicated that it is probably of the M_2X type, or Ti_2B. (N9, M26, Ti, B)

84-N. Phase Equilibria in an Ordering Alloy System. J. B. Newkirk, R. Smoluchowski, A. H. Geisler, and D. L. Martin. *Journal of Applied Physics*, v. 22, Mar. 1951, p. 290-293.

Equilibria between phases in Pt alloys containing 42, 48, and 54% Co were determined below 1000° C. This system of alloys exhibits an order-disorder transition analogous to that for CuAu. A temperature range in which ordered and disordered phases coexist in equilibrium was determined for each alloy. These data were incorporated in the phase diagram. 16 ref. (N10, M24, Pt, Co)

85-N. A Metallographic Study of Diffusion Interfaces. G. C. Kuczynski and B. H. Alexander. *Journal of Applied Physics*, v. 22, Mar. 1951, p. 344-349.

By sintering wires to flat metallic blocks, diffusion interfaces were obtained between Cu-Ni, Au-Ag, Cu-Ag, Cu-Fe, Fe-Ni, Cu-Zn, Ni-Zn, and 70-30 brass-Cu. The interfaces were investigated metallographically. Grooves were observed in the lower-melting-point component in the vicinity of the sintered interfaces. This is attributed to the faster diffusion rate in the lower-melting-point metal. (N1, Cu, Ni, Au, Ag, Fe, Zn)

86-N. The Effects of Alloying Elements in Steel. III. (Concluded). Joseph K. Stone, Jr. *Industrial Heating*, v. 18, Mar. 1951, p. 434, 436, 438.

The solution strengthening of ferrite and the stabilization of carbides. (N8, ST)

87-N. The Cohesion of Alloys. I. Intermetallic Systems Formed by Copper, Silver, and Gold, and Deviations From Vegard's Law. II. Some General Metallurgical Implications. W. G. Henry, M. A. Jaswon, and G. V. Raynor. **III. Extension to High Solute Concentrations, and Application to the Alloys of Group IA Metals.** W. G. Henry and G. V. Raynor. *Proceedings of the Physical Society*, v. 64, sec. B, Mar. 1, 1951, p. 177-206.

A new treatment designed to extend the theory of the cohesion of metals to alloy structures. Excess energy of the solid solution, as compared with that of a mixture of the pure components, is estimated by assuming that introduction of a solute atom causes a major disturbance extending only to its nearest neighbors, and a less serious disturbance in the surrounding matrix. Deviations from Vegard's law to be expected in the solid solutions formed by Cu, Ag, and Au taken in pairs are evaluated. Application of the theory to problems of solid-solution formation. Part II: certain phenomena of general theoretical interest. Part III: the theory is applied to estimation of extra energy associated with the solution of one metal in another to form an alloy. Calculations made for the binary alloys of the alkali metals give good results. Solid-solution formation is restricted in all the possible systems except K-Rb, K-Cs, Rb-Cs, Na-K, Na-Rb, and Na-Cs. The eutectic compositions in the systems Na-K, Na-Rb, and Na-Cs; the formation of immiscible liquid systems. 22 ref. (N12, Cu, Ag, Au, EG-e)

88-N. Growth of Single Crystals of Tin From the Melt. A. J. Goss and S. Weintroub. *Nature*, v. 167, Mar. 3, 1951, p. 349-350.

Experimental work. (N12, Sn)

89-N. The Shaping of Metal Crystals. P. R. Rowland. *Transactions of*

the Faraday Society, v. 47, Feb. 1951, p. 193-194.

A method for growing metal single crystals from the melt in shapes such as spheres, flat strips, mechanical test pieces, etc., suitable for chemical and physical examination. A simple technique for preparing a flat surface parallel to a given crystal plane. (N12, M23)

90-N. Theory of Order-Disorder Transformation in Binary Alloys. (In French.) Gérard Fournet. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Jan. 8, 1951, p. 155-157.

The general theory of Yvon and indicates its possible application to the above modifications. Agreement with experimental data of Chipman and Warren and of Cowley is shown. (N10)

91-N. Existence of a Nucleation Process in Controlled Oxidation of Iron at High Temperatures. (In French.) Jean Bardolle and Jacques Bénard. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Jan. 15, 1951, p. 231-232.

Studies using pure electrolytic or Armco iron at 850° C. under vacuum, using nitrogen plus traces of oxygen, oxides, or incompletely deoxidized metals as deoxidizing agents. Results prove existence of a relationship between orientation of the oxide lattice and that of the base metal. (N2, R2, Fe)

92-N. A Theory of Cooperative Phenomena. Ryoichi Kikuchi. *Physical Review,* ser. 2, v. 81, Mar. 15, 1951, p. 988-1003.

A new method of approximation for order-disorder phenomena is explained for the one-dimensional Ising lattice. Approximations already known, such as those of Bethe and of Kramers-Wannier, are shown to be derived as special cases of the method with suitable choices of variables. An improved treatment for the 3-dimensional simple cubic Ising lattice is found to agree with the rigorous expansion of the partition function up to the 4th moment by Kirkwood's moment method, so far as the disordered state is concerned. The general formula for entropy. An improved treatment of the face-centered lattice (Ising model). 19 ref. (N10)

93-N. Thermodynamics and Structure of the Iron-Carbon Alloys. (In German.) Erich Scheil. *Archiv für das Eisenhüttenwesen,* v. 22, Jan.-Feb. 1951, p. 37-52.

Attempts to develop a new concept of Fe-C melts and solid solutions. Calculations lead to the conclusion that C is primarily in gaps between the Fe atoms, and that when one gap is occupied, occupation of the neighboring gaps is improbable because of increase in electron concentration. Wagner and Schottky's disorientation formulas are modified to facilitate the calculations. 62 ref. (N12, P12, ST)

94-N. Gases in Pig Iron and Their Influence on the Quality of Raw Materials. (In Czech.) Vladimir Zednik. *Hutnické Listy,* v. 5, Nov. 1950, p. 445-449; Dec. 1950, p. 485-492; disc. p. 492-495.

An anomalous relationship of oxygen solubility in iron to temperature and thermodynamic oxidation equilibrium. Summarizes existing theories of influence of gases on the quality of pig and cast irons. Results of experiments show wide variation in gas content, even for consecutive samples from one heat. H_2 content usually rises parallel to O_2 content. Laboratory and plant tests show that remelting has a favorable effect on dissolved gas content. Photomicrographs show effect of gas content on graphitization and microstructure. 14 ref. (N12, CI)

95-N. Self-Diffusion in Cobalt. Foster C. Nix and Frank E. Jaumot, Jr. *Physical Review,* ser. 2, v. 82, Apr. 1, 1951, p. 72-74.

Measured by using radioactive Co^{60} which was evaporated onto the surface of pure Co samples. Data at 1050, 1150, and 1250° C. are used to develop an empirical formula for the self-diffusion coefficient. (N1, Co)

96-N. Eutectic Solidification in Metals. W. C. Winegard, S. Majka, B. M. Thall, and B. Chalmers. *Canadian Journal of Chemistry,* v. 29, Apr. 1951, p. 320-327.

A study was made of the solidification of Sn-Pb alloys, whose eutectic structures are typically lamellar. A technique was developed in which rate and direction of solidification are controlled. It is shown that freezing takes place by simultaneous edgewise growth of the lamellae, the thickness of which depends on rate of freezing. The solid-liquid interface at any instant is corrugated, owing to the fact that one of the phases is in advance of the other. A detailed description of the process of eutectic solidification. 10 ref. (N12, Sn, Pb)

97-N. Mechanism of Precipitation in Aluminium-Magnesium Alloys. E. C. W. Perryman and G. B. Brook. *Journal of the Institute of Metals,* v. 79, Mar. 1951, p. 19-34.

The precipitation mechanism in commercial-purity Al with 7% Mg

and high-purity Al with 10% Mg was investigated by metallographic methods, and by hardness and X-ray measurements. Effect of 0.5 and 1% Zn on rate of precipitation and hardening of the former alloy was also studied. Includes photomicrographs, diffraction patterns, tables, and graphs. 21 ref. (N7, Al)

98-N. Regular Distribution of Precipitates in a Copper-Beryllium Alloy After Long-Time Aging. (In Russian.) B. M. Rovinskii and N. D. Gambashidze. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 76, Jan. 21, 1951, p. 399-401.

Precipitation of new phases from a saturated solid solution of about 2% Be in Cu aging for about 15 years and their distribution in the crystal lattice. Method of investigation. (N7, Cu)

99-N. (Book) **Crystal Growth.** H. E. Buckley. 571 pages. 1951. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. $9.00.

Solution and solubility, artificial preparation of crystals, theories of crystal growth, velocities of growth, diffusion theories, ideal and real crystals, types of crystallization, dissolution phenomena, crystal-habit modification by impurities, relationships of substances during crystallization, and peculiarities of crystal growth. Much of the theory is applicable to both metals and nonmetals. Most of the illustrations given are nonmetallic, however, sections are included on metallic crystals. Extensive chapter bibliographies. (N12, N2, M26)

100-N. Molybdenum Corrects Temper Embrittlement From Phosphorus. Julius J. Harwood. *Steel,* v. 128, Apr. 23, 1951, p. 78.

Effect of Mo on transition temperatures of AISI-SAE 1340 and SAE 5140 steels. (N8, AY)

101-N. Theory of D_0 for Atomic Diffusion in Metals. Clarence Zener. *Journal of Applied Physics,* v. 22, Apr. 1951, p. 372-375.

Theory of the entropy of activation ΔS for interstitial diffusion in metals is extended to self and to chemical diffusion. 18 ref. (N1)

102-N. The Titanium-Hydrogen System and Titanium Hydride. II. Studies at High Pressure. Thomas R. P. Gibb, Jr., James J. McSharry, and Robert W. Bragdon. *Journal of the American Chemical Society,* v. 73, Apr. 1951, p. 1751-1755.

Equilibrium pressure of H_2 over the metallic Ti-H_2 system was measured as a function of content of the solid phase. Measurements were made over the range 175-1000° C. at pressures up to 5000 cm. Results are plotted as log P vs. reciprocal of absolute temperature. A family of isotherms shows plateaus at composition approaching TiH_2, indicating presence of a novel phase. 11 ref. (N12, Ti)

103-N. They're Running Down Gases in Steel. W. A. Peifer. *Steel Horizons,* v. 13, Spring 1951, p. 20-22.

Illustrated review of research on hydrogen in steel, its causes and prevention. (N1, EG-m, ST)

104-N. Preferred Orientation in Zirconium. R. K. McGeary and B. Lustman. *U. S. Atomic Energy Commission,* AECD-2951, Mar. 10, 1950, 24 pages.

Investigated under the following treatments: various types of cold rolling, cross rolling, hot rolling, recrystallization below the transformation temperature, and heating above the transformation temperature. 18 ref. (N5, Q24, Zr)

105-N. A Theory of the Transformation in Pure Cobalt. J. W. Christian. *Proceedings of the Royal Society,* v. 206, Mar. 22, 1951, p. 51-64.

The suggestion that faults in hexagonal Co are in thermal equilibrium with the structure and that the phase change in pure Co is influenced considerably by surface energy is examined. Shows that for the pseudo-equilibrium of a number of individual crystals, surface-energy effects could produce transformation over a temperature range; but other effects of the transformation are not explained. Quantitative results for hexagonal faults show that these cannot be in thermal equilibrium. Shows that the transformation in Co is martensitic in nature. The mechanism is considered in terms of "half dislocations" of the face-centered cubic lattice. 18 ref. (N9, Co)

106-N. Influence of Rate of Cooling After Homogenization on Kinetics of the Decomposition of Supersaturated Solid Solutions of Magnesium and of Silicon in Aluminum. (In French.) H. Jolivet and M. Armand. *Revue de Métallurgie,* v. 48, Feb. 1951, p. 91-96.

The kinetics of decomposition of these solid solutions is dependent upon the rate of cooling after homogenization. Precipitation at a rapid rate of cooling is assisted considerably by previous cold working. The influence of cold working on rate of precipitation is also more important than previous formation of a precipitated phase during slow cooling. (N7, Al)

107-N. Microradioanalytical Methods in the Study of the Diffusion of Cop-

per into Aluminum in the Presence of Calcium. (In French.) Mladen Paic. *Revue de Métallurgie,* v. 48, Feb. 1951, p. 116-120.

Influence of Ca on the diffusion of Cu into Al plating on Al-Cu-Mg alloys. (N1, Al, Cu)

108-N. On the Behavior of Enormously Large Internal Stress Accompanying the Transformation of a Substance. (In English.) Kotaro Honda. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, May 1949, p. 1-6.

As an example, the A_3 transformation of Fe is discussed theoretically. Application to pure Fe, and to Fe-Ni and Fe-Mn alloys. (N8, Fe)

109-N. On the Mechanism of the Formation of Pearlite in Steels. (In English.) Kotaro Honda. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, May 1949, p. 7.

(N8, ST)

110-N. On $\gamma \rightleftarrows \alpha$ Transformation in Fe-Ni Alloys by Supercooling or Superheating. (In English.) Sakae Takeuchi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, May 1949, p. 43-49.

Studied for alloys containing 10, 18, 25, and 27% Ni. (N8, Fe)

111-N. On the Velocity of Decomposition of Cementite. (In English.) Hiroshi Yoshisaki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, May 1949, p. 63-70.

Results of experimental investigation of the above, as it occurs during conversion of white to gray iron. (N8, CI)

112-N. On the Theory of the Formation of Ferromagnetic Superlattice Alloys. (In English.) Hiroshi Sato. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, May 1949, p. 71-82.

Statistical mathematical treatment. Includes application to the antiferromagnetic case. 16 ref. (N10, P16, SG-n, p)

113-N. "Temperature Interval" of Lattice Transformation. I. (In English.) Sakae Takeuchi and Hideji Suzuki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Feb. 1950, p. 43-49.

An attempt was made to explain the effects of retained austenite on lattice transformation in Fe-C and Fe-Ni alloys. (N8, Fe, ST)

114-N. Vibration of Liquid Mg-Al Alloys. *Metal Progress,* v. 59, Apr. 1951, p. 560. (Translated and condensed from "The Effect of Sonic and Ultrasonic Vibrations on the Structure of Magnesium-Aluminum Alloys With 4 to 12% Al", Charlotte Siebers and Walter Bulian.)

Previously abstracted from *Metallforschung.* See item 4d-55, 1948. (N12, Mg, Al)

115-N. Producing Single Crystals of Metal. M. A. Steinberg. *Journal of Metals,* v. 3, May 1951, p. 387-388.

Methods used by Horizons, Inc., Cleveland: growth of a crystal from a single nucleus of a new phase; and growth of an existing grain of a polycrystalline specimen to a single crystal through a temperature gradient without recourse to nucleation of a new phase or recrystallization. (N12)

116-N. Isothermal Transformation Characteristics on Direct Cooling of Alloyed White Iron. F. B. Rote, G. A. Conger, and K. A. DeLonge. *American Foundrymen's Society,* Preprint 51-9, Apr. 1951, 13 pages.

Investigation on white iron containing 3.40 C, 1.15 Si, 0.35 Mn, 4.50 Ni, 1.85 Cr, and 0.12 Mo. A complete T-T-T diagram was determined from data obtained by hardness tests and microscopic examinations of wedge-shaped castings, directly air-cooled from the mold to subeutectoid temperatures for isothermal transformation. (N8, CI)

117-N. Mechanism of Crystal Growth. A. G. Smekal. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 27-38; disc. p. 38-39.

Since only noncrystallographic growth was found in the recrystallization of metals, the experiments were done on NaCl as a model substance because of its similar behavior to metals. The self-diffusion mechanisms of NaCl were revealed by the behavior of its ionic conductivity. Transparency of the material allowed detection of new grain growth, first at diameters of about 5 microns, and allowed the measurement of rates of growth and induction periods very accurately and reproducibly. In the recrystallization of sintered-powder compacts of NaCl, single crystals in which voids develop into hollow cubes were obtained. Concludes that the actual densification of polycrystalline materials requires assistance of elastic stresses which are always present in polycrystalline specimens. 15 ref. (N3, N5)

118-N. Orientation in Recrystallization and Grain Growth. P. A. Beck. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 40-50; disc. p. 50-51.

Shows that orientation relationships found in recrystallization and coarsening of Cu and Al structures, approaching a single orientation, result from orientation dependence of rate of growth. Recrystallization tex-

tures in deformed polycrystalline metals with more complicated deformation textures can often be interpreted in terms of the same orientation relationships. The relationships leave open the basic physical question: Why does rate of growth depend on relative orientation of growing grain and matrix? 15 ref. (N3, N5)

119-N. Recrystallization. Marian Balicki. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 52-75. disc. p. 75-76.

It was demonstrated in 1936 that the main stage of reannealing of work hardened metals, i.e., recrystallization, can be accounted for quantitatively. Accuracy of the treatment is believed to be sufficient for all practical purposes. Report summarizes the approach and contains an extension of the theory. (N5)

120-N. Self-Diffusion in Iron. F. S. Buffington, I. D. Bakalar, and Morris Cohen. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 92-107; disc. p. 107-108.

Some of the techniques that have been used for self-diffusion measurements, and results of an original investigation of self-diffusion in pure Fe. Radioactive tracers have proved to be a most valuable tool for such studies. 15 ref. (N1, Fe)

121-N. Homogeneous Nucleation. David Turnbull and J. H. Hollomon. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 109-140; disc. p. 141-142.

Nucleation of a new phase appears to be quite unrelated to sintering of metal powder. However, kinetics of the two processes appears to be largely controlled by the same physical constants: surface energy and diffusion coefficients. Theory of homogeneous nucleation; nature of nucleation catalysis; methods for experimental confirmation of theory; liquid-solid, solid-vapor, and solid-solid transformations; and transformations without composition change. 46 ref. (N2, H15)

122-N. Relations Between Diffusion and Viscous Flow in Metals. B. H. Alexander, G. C. Kuczynski, and M. H. Dawson. "The Physics of Powder Metallurgy", Ed. 1 (McGraw-Hill, New York), 1951, p. 202-213; disc. p. 213.

Discussion on the basis of the literature, reviewing both theoretical and experimental work. Work using gold wires to obtain strain-time plots. 11 ref. (N1, Q24, Au)

123-N. The Application of Hydrogen Equilibrium-Pressure Measurements to the Investigation of Titanium Alloys Systems. A. D. McQuillan. *Journal of the Institute of Metals,* v. 79, Apr. 1951, p. 73-88.

A method for investigation of equilibrium relations in certain alloy systems, which depends on measurement of H_2 pressures in equilibrium with a very dilute solution of H_2 in the alloys. The method is illustrated by a theoretical treatment of a hypothetical, simplified system, and is then applied to a series of alloys in a limited region of the Ti-Cu and Ti-Fe systems. It was found that both Cu and Fe depress the $\alpha \rightleftarrows \beta$ transformation in Ti. Effect of these elements on solubility of H_2 in Ti-rich β-solid solution. (N6, M24, Ti)

124-N. Joint Discussion on the Papers: "The Overheating and Burning of Steel. Part III. The Influence of Excessive Reheating Temperatures on the Mechanical Properties and the Structure of Alloy Steels", A. Preece, J. Nutting, and A. Hartley; **"The Detection of Overheating and Burning in Steel by Microscopical Methods,"** A. Preece and J. Nutting; **"Grain-Boundary Phenomena in Severely Heated Steel,"** T. Ko and D. Hanson; **and "A Note on the Overheating of Steels,"** E. C. Rollason and D. F. T. Roberts. *Journal of the Iron and Steel Institute,* v. 167, Apr. 1951, p. 367-372.

(N8, N12, M21, Q general, ST)

125-N. Discussion on the Paper: "The Extension of the Ar_1 Range With Carbide Formation in Mild Steel Due to High-Temperature Treatment," J. H. Whitely. *Journal of the Iron and Steel Institute,* v. 167, Apr. 1951, p. 372-374.

(N8, CN)

126-N. Reactions Induced by Cold Hardening and Annealing of Low-Carbon 18-8 Steels. (In French.) P. Bastien and J. Dedieu. *Métaux & Corrosion,* v. 25, Dec. 1950, p. 308-311.

A series of stainless steels with different Ni content (4-12%) was studied. It was found that a difference of only 1% Ni results in the change from an unstable to an almost completely stable state, the amount of other components and condition of treatment being the same. Experimental investigation of two specimens, one stable (10% Ni), the other unstable (9% Ni), showed the possibility of causing the $\gamma \rightarrow \alpha$ transformation to take place at room temperature by cold hardening and formation of a sigma phase by annealing. (N8, J23, J26, SS)

127-N. Thermomagnetic Study of Iron and Nickel Carbides. (In French.) Roger Bernier. *Annales de Chimie,* v. 6, Jan.-Feb. 1951, p. 104-159.

Investigation of structure, mechanism of formation, properties, behavior of cementite and related carbides, depending on temperature, and a thorough analysis of the Fe-Ni-C ternary system. Technique of

investigation is described, data and results. 66 ref.
(N8, M24, Fe, Ni, C-n)

128-N. Transformations in the Range of the Ternary α-Au-Cu-Zn Solid Solutions. (In German.) Ernst Raub and Paul Walter. *Zeitschrift für Metallkunde,* v. 41, Nov. 1950, p. 425-433.

Studied by micrographic, thermal-resistance, and X-ray methods for 25 alloys containing 15-25% Au, 43-72% Cu, and 3.4-42.0% Zn.
(N6, Au, Cu, Zn)

129-N. Transformation of Austenite in a Manganese-Molybdenum Steel Deposited as Weld Metal. Hallock C. Campbell. *Welding Journal,* v. 30, May 1951, p. 253s-254s.

Discusses above paper by O. O. Miller, F. C. Kristufek, and R. H. Aborn. (Sept. 1950 issue; see item 192-N, 1950.) (N8, AY)

130-N. Grain Boundary Diffusion in Metals. A. D. LeClaire. *Philosophical Magazine,* ser. 7, v. 42, May 1951, p. 468-474.

An expression is derived relating the diffusion coefficients for grain boundary and for volume diffusion, effective "width" of the grain boundary, and angle at a certain time between a line of constant concentration and the grain boundary at the point where it meets the grain boundary. Relation of other work on grain boundaries to grain-boundary diffusion. Suggests that activation energies for grain boundary and for volume diffusion may not differ appreciably. 13 ref. (N1)

131-N. Theories on the Age-Hardening of Metallic Alloys. (In German.) F. Rohner. *Berg-und Hüttenmännische Monatshefte,* v. 96, Feb. 1951, p. 21-25.

Theories are numerous and often conflicting. The great difficulty in investigating this problem lies in our incomplete knowledge of the relationship of mechanical and physical properties to atomic structure of alloys. 40 ref. (N7)

132-N. The Segregation Process in Copper-Beryllium Alloys. (In German.) W. Gruhl and G. Wassermann. *Metall,* v. 5, Mar. 1951, p. 93-98; Apr. 1951, p. 141-145.

Experiments made to study segregation in an alloy containing 1.82% Be by measuring changes in electrical resistance and by microscopic and X-ray studies. The effect of cold working directly after quenching on the segregation of the various phases was also investigated. Phase diagrams, graphs, X-ray pictures and photomicrographs. 26 ref. (N12, N7, Cu)

133-N. Lattice and Grain Boundary Self-Diffusion in Silver. R. E. Hoffman and D. Turnbull. *Journal of Applied Physics,* v. 22, May 1951, p. 634-639.

Coefficients of self-diffusion were measured over extended temperature ranges. Empirical equations are developed to represent the data. 18 ref. (N1, Ag)

134-N. X-Ray Measurement of Long-Range Order in β-AgZn. L. Muldawer. *Journal of Applied Physics,* v. 22, May 1951, p. 663-665.

Replacement of small amounts of Ag by Au in AgZn raises the critical temperature for long-range ordering and completely suppresses the zeta-phase. Measurements of T_c were made in a high-temperature camera using several percentages of Au. Variation of long-range order with temperature was determined from measurements of the integrated intensity of the (111) superstructure line, using a compact of filings of composition of 3.5 Au, 46.5 Ag, and 50.0 Zn.
(N10, M22, Ag, Zn)

135-N. The Production and Detection of a Non-Equilibrium Number of Vacancies in a Metal. A. S. Nowick. *Physical Review,* ser. 2, v. 82, May 15, 1951, p. 551-552.

The experiments described seem to be the most direct evidence, to date, that diffusion in close-packed metals occurs predominantly through movement of vacancies. It was found that anelastic effects occur in alloys when the two components differ in size. The alloys used were α solid solutions of Ag-Zn; it was found, for example, that total relaxation in an alloy of 29 at .% Zn is about 0.18. (N1)

136-N. Recovery and Recrystallization in Highly Stressed Pure Aluminium. E. A. Owen and J. H. Liu. *Proceedings of the Physical Society,* v. 64, sec. B, May 1, 1951, p. 386-396.

Results of an X-ray study of phenomena observed when polycrystalline pure Al is subjected to heavy compressional stresses. Rate of recovery to the metastable state under various conditions was examined in some detail. Results are considered in the light of dislocation theory. (N4, N5, Al)

137-N. Grain Growth in a Texture Studied by Means of Electron-Emission Microscopy. (In English.) G. W. Rathenau and G. Baas. *Physica,* v. 17, Feb. 1951, p. 117-128.

Grain growth and secondary recrystallization in rolled face-centered Ni-Fe alloys were studied by electron-optical means, an image of the activated hot-metal surface being formed. Grain growth in an imperfect cubic texture proved to be a discontinuous process. 19 ref.
(N3, Ni, Fe)

138-N. Transformations in the Copper-Silicon System. (In German.) Wilhelm Hofmann, Jürgen Ziegler, and Heinrich Hanemann. *Zeitschrift für Metallkunde,* v. 42, Feb. 1951, p. 55-57.

A study was made with 22 alloys containing 2-11% Si, melted under N_2, and homogenized 2-4 hr. at 800° C., followed by annealing at 700, 600, and 500° C. The resulting phases were radiographically and microscopically investigated. Constitution diagrams show fairly close agreement of the author's studies with those by C. S. Smith. X-ray pictures and photomicrographs. 10 ref. (N9, Cu)

139-N. The Epitaxy of Alkali Chlorides on Metals. G. W. Johnson. *Journal of Applied Physics,* v. 22, June 1951, p. 797-805.

The alkali chlorides were crystallized from solution on single crystals and on polycrystalline specimens of various metals. Oriented growth was obtained on Ag, Au, Cu, Zn, Pb, Sb, Bi, and Fe. Since oxide films were present on all metals except Ag and Au, it was concluded that the oxides were oriented with respect to the metallic substrate. From results with Ag and Au, it was found that the permissible misfit for epitaxy to occur was of the same order (about 10%) as for ionic pairs. 27 ref. (N5, R2)

140-N. On the Volume Diffusion of Metals. G. J. Dienes. *Journal of Applied Physics,* v. 22, June 1951, p. 848-849.

In a recent paper, the writer described an empirical correlation between frequency factor and activation energy for the above. Zener has advanced a different explanation and several new experimental diffusion studies have appeared in the literature. Comments briefly on these new developments. (N1)

141-N. Growth of Molybdenum Single Crystals. N. K. Chen, R. Maddin, R. B. Pond. *Journal of Metals,* v. 3, June 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 461-464.

A method in which the basic idea of the Andrade furnace is utilized. Modifications are employed so that large single crystals of Mo or any refractory metals can be grown. (N12, Mo)

142-N. Origin of the Cube Texture in Face-Centered Cubic Metals. Paul A. Beck. *Journal of Metals,* v. 3, June 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 474-475.

Critically discusses the literature. Concludes that the oriented-growth theory of annealing textures readily explains, at least qualitatively, the various conditions and their interrelations that affect the formation of cube texture. 11 ref. (N5)

143-N. Theory of Annealing Textures. Paul A. Beck. *Journal of Metals,* v. 3, June 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 475-476.

Critically discusses literature on the above, in which both the "oriented-nucleation" and the "oriented-growth" theory are supported. Believes that the oriented-growth theory is the more promising one. 12 ref. (N5)

144-N. Kinetics of Precipitation in Supercooled Solid Solutions. G. Borelius. *Journal of Metals,* v. 3, June 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 477-484.

Institute of Metals Division Lecture. Theoretical concepts; experimental work done at the Royal Institute of Technology in Sweden, using a working hypothesis concerning the influence on nucleation of thermodynamic potential barriers. (N7)

145-N. The Approach of Alloys to Equilibrium; Association With Precipitation and Re-Solution. D. McLean. *Metal Industry,* v. 78, May 18, 1951, p. 399-402.

Phenomenon involves appearance or disappearance of phases which exist under a certain set of conditions. (N7)

146-N. Calorimetric Investigation of Precipitation From Solid Solutions of N in α-Fe. (In English.) G. Borelius, Stig Berglund, and Oleg Avsan. *Arkiv för Fysik,* v. 2, No. 6, 1951, p. 551-557.

Specimens of pure Fe saturated with N_2 were heated at various constant temperatures between 170 and 575° C. to determine equilibria, between N_2 dissolved in α-Fe and the nitride Fe_4N. After quenching, precipitation of N_2 from the solution was studied at constant temperatures of 70 or 94° C. by measuring the heat evolved as a function of time. Integration of the curves thus obtained gives total emission of heat during the precipitation process. From this heat and its dependence on temperature, thermodynamic calculations give heat of solution and solubilities of N_2 at various temperatures. (N7, Fe)

147-N. Principal Metallurgical Mechanisms Encountered During the Transformations of Metals and Alloys. (In French.) Jean Hérenguel. *Revue de l'Aluminium,* v. 28, Apr. 1951, p. 124-130.

Emphasis is on the light metals, but the phenomena discussed are generally applicable. (N general)

148-N. Isothermal Transformation Diagrams for Nickel Steels. I. General Discussion of Diagrams. *Metallurgia*, v. 43, May 1951, p. 234-242.

General aspects of isothermal transformation diagrams, including methods of determination, factors influencing shape of curves, and limitations of their use. Practical application of the information obtained. Diagrams for the more important Ni alloy steels. (To be continued.) (N8, AY)

149-N. Crystallisation of Very Thin Gold Layers. (In French.) Antoine Colombani and Gaston Ranc. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences*, v. 232, Apr. 2, 1951, p. 1344-1346.

The layers were deposited by vacuum evaporation on Plexiglas and on NaCl crystals. Electron microscopic investigation showed that layers deposited on Plexiglas do not show microcrystals, even under magnification of 15,000X. A layer deposited on NaCl shows the presence of microcrystals of up to 1000 Å. in diam. Method and technique of investigation. (N15, Au)

150-N. Thermoelastic Analysis of the Transformation of Bronzes. (In French.) Robert Cabarat, Pierre Gence, Léon Guillet, and Albert Portevin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, Mar. 12, 1951, p. 1041-1042.

Using an apparatus formerly described by Cabarat, transformations in the solid state which take place in Cu-Sn alloys containing 20-32% Sn were investigated. Data are charted; results are discussed. (N6, Cu)

151-N. Diffusion Phenomena in Sintered Metals. (In French.) G. Zapf. *Métaux Corrosion—Industries*, v. 26, Jan. 1951, p. 10-19.

The role of superficial and self-diffusion in objects produced by powder metallurgy. Factors inhibiting selfdiffusion; methods for preventing their inhibiting action are described. Data on various ferrous and nonferrous metals are charted and tabulated. 14 ref. (N1, H15)

152-N. Zinc Plating Grows a Beard. *Bell Laboratories Record*, v. 29, June 1951, p. 262-263.

A puzzling phenomenon encountered on some precision electrical filters of the hermetically sealed type. A few months after construction, some of these filters showed abnormally high transmission losses to low-level currents. This was found to be caused by growth of fine "whiskers" on the Zn-plated surfaces. These filaments appear to be pure Zn. Similar "whiskers" can be grown on Cd and Sn electrodeposits, but not on Cu; so the latter is being substituted as a plating on steel where considered necessary. (N12, L17, Zn)

153-N. Spherulite Formation in Nodular Cast Iron. A. L. DeSy. *Metal Progress*, v. 59, June 1951, p. 798-801.

Photomicrographs and time-temperature curves for the solidification process. The actual mechanism was not determined; however, it was found that incorporation of minute percentages of strong deoxidizers like Mg, Ce, Li, Ba, Ca, and Sr, give the result; and that the solidification of as-cast nodular Mg-treated Fe corresponds to undercooling without any recalescence. (N12, E25, CI)

154-N. Partial Stabilization of Stainless Steels. Stephen F. Urban. *Metal Progress*, v. 59, June 1951, p. 815.

An attempt was made to melt 18-8 to 0.15% C specification and stabilize part of the C with Ti rather than melt to the customary 0.07% max. C. Tests showed that the desired objective was not obtained. The author believes that similar results would be obtained with Cb and that they are explainable by formation of complex carbides. (N8, SS)

155-N. Aging of Al-Cu-Ti Alloys. *Metal Progress*, v. 59, June 1951, p. 862, 866, 868. (Condensed from "The Effect of Small Quantities of Cd, In, Sb, Tl, Pb, or Bi on the Aging Characteristics of Cast and Heat Treated Aluminum —4% Copper—0.15% Titanium Alloy", H. K. Hardy.)

Previously abstracted from *Journal of the Institute of Metals*. See item 46-N, 1951. (N7, Al)

156-N. Order-Disorder Changes in Alloys. H. Lipson. "Progress in Metal Physics" (Interscience Publishers, New York), p. 1-52.

Superlattice structures described as completely as possible, showing how X-ray diffraction effects arise. 108 ref. (N10)

157-N. Internal Strains and Recrystallization. R. W. Cahn. "Progress in Metal Physics" (Interscience Publishers, New York), p. 151-176.

The processes that occur during the annealing of deformed crystalline solids are usually classified in four groups: recovery, primary recrystallization, grain growth, and secondary recrystallization. A 5th type has only recently been studied systematically; its connection with the others, particularly with primary recrystallization. The discussion cen-

ters largely on internal strains present in deformed solids. 75 ref. (N4, N5, Q25)

158-N. Researches on the Polygonization of Metals. A. Guinier and F. Tennevin. "Progress in Metal Physics," (Interscience Publishers, New York), p. 177-192.

Use of a modified Laue diffraction technique to detect differences in orientation of the lattice planes within a crystalline block. A series of experiments on Al samples which display conditions necessary for occurrence of polygonization. Influence of degree of deformation and annealing procedure. (N5, Q24, Al)

159-N. Polygonization in Strongly Deformed Metals. C. Crussard, F. Aubertin, F. Faoul, and G. Wyon. "Progress in Metal Physics" (Interscience Publishers, New York), p. 193-202.

Experimental evidence for polygonization in fine-grained metals heavily cold worked before annealing, based on micrography and X-ray studies, and indirectly on observation of other physical properties (plasticity, thermoelectric power) which are influenced by polygonization. Work was done with Cu and Al. 13 ref. (N5, Q24, Cu, Al)

160-N. X-Ray Data on the Aging of an Al-Cu Alloy. (In Russian.) Yu. A. Bagaryatskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Mar. 11, 1951, p. 261-264.

Analyzes results of X-ray investigation of an Al-Cu alloy containing 4% Cu, in order to determine the mechanism of aging. The main factor responsible for natural aging of an Al-Cu alloy appears to be the considerable difference in specific atomic volumes of solid solution and precipitation phases. In Al-Cu-Mg and Al-Ag alloys this difference is insignificant; and hence, the mechanism of aging of these alloys is basically different. 11 ref. (N7, Al)

161-N. The Dissociation Pressures of Thorium Dihydride in the Thorium-Thorium Dihydride System. Manley W. Mallett and Ivor E. Campbell. *Atomic Energy Commission,* AECD-3109, Jan. 31, 1951, 15 pages.

Dissociation pressures were measured in the thorium-hydrogen system for the range of compositions up to approximately ThH 1.90 at temperatures of 650-875° C. Experimental procedure and results. The system resembles the Pd-H system in that the observed dissociation pressures are dependent on the solid-phase composition throughout the system. 10 ref. (N15, Th, EG-h)

162-N. Secondary Recrystallization in Copper Wire. Guido Bassi. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 533-534.

Results of X-ray diffraction and micrographic investigation. Effects of different annealing and deformation procedures. (N5, Cu)

163-N. An Experimental Survey of Deformation and Annealing Processes in Zinc. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 541-544.

Discussion of above paper by D. C. Jillson. (Aug. 1950 issue; see item 169-N). (N4, N5, Q24, Zn)

164-N. Activation Energy for Recrystallization in Rolled Copper. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 548-549.

Discussion of above paper by B. F. Decker and D. Harker. (June 1950 issue; see item 145-N). (N5, P13, Cu)

165-N. Production and Examination of Zinc Single Crystals. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 550-551.

Discussion of paper by D. C. Jillson. (Aug. 1950 issue; see item 168-N). (N12, Zn)

166-N. On the Martensitic Transformation at Temperatures Approaching Absolute Zero. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 551-553.

Discussion of above paper by S. A. Kulin and Morris Cohen. (Sept. 1950 issue; see item 179-N). (N8, SS, AY)

167-N. The Isothermal Transformation of a Eutectoid Beryllium Bronze. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 553-556.

Discussion of above paper by Ronald H. Fillnow and David J. Mack. (Oct. 1950 issue; see item 222-N). (N9, Cu)

168-N. Aging Characteristics of Magnesium-Lithium Base Alloys. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 560-561.

Discussion of above paper by P. D. Frost, J. G. Kura, and L. W. Eastwood. (Oct. 1950 issue; see item 227-N). (N7, Q27, R1, Mg)

169-N. Dendritic Crystallization of Alloys. *Journal of Metals,* v. 3, July 1951; *Transactions of the American In-*

stitute of Mining and Metallurgical Engineers, v. 191, 1951, p. 561-563.

Discussion of above paper by B. H. Alexander and F. N. Rhines. (Oct. 1950 issue; see item 226-N). (N12, EG-a)

170-N. Theory of Grain Boundary Motion. R. Smoluchowski. *Physical Review*, ser. 2, v. 83, July 1, 1951, p. 69-70.

The mobility of grain boundaries in metals is considered from a point of view similar to that used by Mott in his theory of viscosity of grain boundaries. By introducing a factor dependent on surface tension of the grain boundary and inserting the experimental activation energy, satisfactory agreement with experiment was obtained. (N3, P12, Al, Ag, Cu)

171-N. Anisotropy of Diffusion in Grain Boundaries. M. R. Achter and R. Smoluchowski. *Physical Review*, ser. 2, v. 83, July 1, 1951, p. 163-164.

Crystallographic aspects. Experiments consisted in measuring diffusion of Ag along grain boundaries of columnar Cu. The amount of penetration was observed by means of differential etching of silver-rich Cu. (N1, Ag, Cu)

172-N. A Note on the Existence of a Solution to a Problem of Stefan. G. W. Evans, II. *Quarterly of Applied Mathematics*, v. 9, July 1951, p. 185-193.

When certain metals are heated slowly, the temperature rises until it reaches a critical temperature at which the structure of the metal changes from one crystalline form to another. Accompanying this change of crystalline form is a latent heat of recrystallization. In order to study the process, the associated mathematical problem, which requires solution of a partial differential equation in a region with an undetermined boundary, was investigated. (N5)

173-N. Magnetic Analysis of Iron-Carbon Alloys; The Tempering of Martensite and Retained Austenite. J. Crangle and W. Sucksmith. *Journal of the Iron and Steel Institute*, v. 168, June 1951, p. 141-151.

Observation of structure-insensitive magnetic properties is used to examine the phases involved when quenched pure Fe-C alloys are reheated. During the first stage of the martensite breakdown a ferromagnetic phase different from cementite is precipitated; some of its magnetic properties are indicated. Retained austenite is found to change into the same state as martensite. After heating to 300° C., cementite and another carbide were found to be present. 26 ref. (N8, P16, CN)

174-N. Some Reactions in the Iron-Carbon System: Application to the Tempering of Martensite. L. J. E. Hofer and E. M. Cohn. *Nature*, v. 167, June 16, 1951, p. 977-978.

The following reactions were observed and are discussed and diagrammed: $Fe_2C + a - Fe \rightarrow Fe_3C$, and $3Fe_2C \rightarrow 2Fe_3C + C$. 14 ref. (N8, Fe, ST)

175-N. Annealing of Martensite in Steels. (In French.) André Michel. *Bulletin du Cercle d'Etudes des Métaux*, v. 5, Sept.-Dec. 1950, p. 337-356; disc., p. 356-357.

Origin of martensite in the annealing process under various conditions and for various kinds of steel. (N8, J23, ST)

176-N. Crystal Orientation During Cementation. (In French.) Félix Bertaut and Pierre Blum. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, Apr. 23, 1951, p. 1566-1568.

Orientations obtained by cementation reactions, and due, not to epitaxy, but to anisotropy of the rate of growth, hence to the structure of the substance at which the reaction takes place. These reactions were accomplished by fused-salt electrolysis, on flat surfaces or cylindrical wires immersed in the appropriate cementation bath. Results obtained with Fe_2B, Co_2B, Ni_2B, MoB, Fe_2As, Fe_2P, Ni_2P, FeB, CoB, Co_2Si, Co_2P, and NiB. (N12)

177-N. Study of the Reactions of Cementation in Thin Iron Films. (In French.) J. J. Trillat and S. Oketani. *Métaux: Corrosion—Industries*, v. 26, Apr. 1951, p. 145-152.

Studied by electron diffraction for CO and for $CO+H_2$. Carburization differs greatly in the two cases and the rate of reaction is greatly affected by presence of H_2. In the latter case, a percarbide forms. 13 ref. (N8, Fe)

178-N. Research on Formation of Heterogeneous Coarse Crystals in Al-Mg-Mn Alloys. (In Italian.) M. Monticelli-Papania. *Alluminio*, v. 20, 1951, p. 136-146.

Shows that separation of coarse $MnAl_6$ crystals in above alloys is caused by a high Fe content, rather than by undercooling or by non-uniform chemical constitution. For Mn contents up to 1.6+, Fe should not exceed 0.2%. (N12, Al)

179-N. Graphite Formation in Heat Resistant Molybdenum Steels. (In German.) Hans-Joachim Wiester. *Archiv für das Eisenhüttenwesen*, v. 22, May-June 1951, p. 177-184.

Correlates and analyzes literature on effects of composition, heat treat-

ment, welding procedures, stresses, and deformations on graphitization of 0.15-0.50% Mo in the presence of steam at elevated temperatures and pressures. (N8, AY)

180-N. Recovery Phenomena of Beryllium-Copper Alloys. (In German.) W. Gruhl. *Metall,* v. 5, June 1951, p. 231-238.

Results of experiments confirm the validity of Dehlinger's and Becker's theories of the limits of single-phase precipitation in binary systems. Resistance measurements and X-ray studies prove the reversibility of heterogeneous precipitation and thus demonstrate the validity of Becker's theory of nuclei formation. 12 ref. (N4, Cu)

181-N. Measurement of Carbon Diffusion in Metallic Carbides. G. C. Kuczynski and R. Landauer. *Journal of Applied Physics,* v. 22, July 1951, p. 952-955.

A method for measuring the above is proposed. Rate at which excess metallic inclusions are consumed by carbon diffusing in from a surface is used to indicate the extent to which diffusion has taken place. Conditions are derived under which the results are susceptible to simple analytical treatment. (N1, C-n)

182-N. Allotropy of Beryllium. A. U. Seybolt, Joseph S. Lukesh, and D. W. White. *Journal of Applied Physics,* v. 22, July 1951, p. 986.

Questions conclusions of a recent report by Sidhu and Henry that Be has two co-existing allotropic phases at room temperature. (N6, Be)

183-N. Some Theoretical Aspects of Nucleation. R. M. Butler. *Journal of the Imperial College Chemical Engineering Society,* v. 5, 1949, p. 98-144.

Describes, from a simple thermodynamic viewpoint, reasons for existence of those metastable phases which are significant in a large number of physical processes—chemical engineering, metallurgy, glass industry, and meteorology. (N2)

184-N. The Ageing Characteristics of Binary Aluminium-Copper Alloys. H. K. Hardy. *Journal of the Institute of Metals,* v. 79, July 1951, p. 321-369.

Hardness vs. aging-time curves were obtained on Al alloys containing 2.0-4.5% Cu between 30 and 240° C. Results were analyzed in terms of hardness/concentration, time/concentration, and temperature/time relationships for various parts of the aging curves. They are discussed with reference to a recent thermodynamic analysis of the decomposition of supersaturated solid solutions by H. K. Hardy. Conditions for alloy systems with a negative heat of solution are applied. 73 ref. (N7, Al)

185-N. Isothermal Transformation Diagrams for Nickel Steels. II. Practical Applications and Diagrams for Individual Steels. *Metallurgia.* v. 43, June 1951, p. 280-288.

Includes numerous graphs and tables. (N8, AY)

186-N. Effect of Temperature on Carbon Steel in Refinery Vessels Being Surveyed. V. B. Guthrie. *Petroleum Processing,* v. 6, July 1951, p. 719-721.

Study being conducted by the API Committee on Refinery Equipment and other technical groups. Emphasizes the occurrence and causes of graphitization. (N8, T29, CN)

187-N. Principal Metallurgical Mechanisms Encountered in Transforming Metals and Alloys. (In French.) Jean Hérenguel. *Revue de l'Aluminium,* v. 28, May 1951, p. 171-177.

Heterogeneous textures of various alloys, resulting from soluble and insoluble phases, and ways of minimizing them by heat treatment, quenching, hardening, and precipitation annealing. Emphasis is on Al and its alloys. Note is appended on crystallographic rotation. Includes photomicrographs and 11 ref. (N general, J general, Al)

188-N. On the Aging of Al-Mg Alloys. (In French.) H. Jolivet and M. Armand. *Revue de Métallurgie,* v. 48, May 1951, p. 376-378; disc., p. 378.

The above alloys, when homogenized and quenched in cold water, show at ordinary temperature, a phenomenon of aging which is characterized by contraction, increased hardness, some increase in limit of elasticity and resistance to rupture, and by a significant decline in the values of elongation, rupture, and resistance. (N7, Q general, Al, Mg)

189-N. Second Report of the Committee on Boron Steels. Part I. Effect of Boron on Commercial Ingots Containing Small Amounts of Ni, Cr, and Mo. Part II. Study of the Effects of Boron Additions to Small Carbon Steel and Low-Alloy Steel Castings. (In French.) R. Potaszkin and M. Jaspart. *Revue de Métallurgie,* v. 48, May 1951, p. 379-412; disc., p. 412.

Results of extensive experimental investigation of transformation, structures, and mechanical properties. (N8, M27, Q general, AY)

190-N. (Book) **Progress in Metal Physics. Vol. 2.** Bruce Chalmers, editor. 213 pages. 1950. Interscience Publishers, 250 Fifth Ave., New York 1, N. Y. $8.00.

Second of series of review volumes consists of seven papers by different authors covering different aspects of physical metallurgy. Individual papers are abstracted separately. (N general, P general)

191-N. Stranger Atoms in Precipitation Hardening. II. *Metal Industry,* v. 79, July 13, 1951, p. 27.

The effect of ternary additions on the age-hardening of a copper-silver alloy. Results are not conclusive. (N7, Ag, Cu)

192-N. Anelastic Measurements of Diffusion Coefficients in F.C.C. Substitutional Solid Solutions. A. D. Le Claire. *Philosophical Magazine,* ser. 7, v. 42, July 1951, p. 673-688.

Shows how in face-centered cubic substitutional solid solutions of metals, measurements upon that form of anelasticity which is associated with the preferential reorientation of pairs of solute atoms in the presence of a tensile stress, may be used to obtain the diffusion coefficient of the solute atoms. Advantages and disadvantages of this method and some possible further developments of the theory. 15 ref. (N1, Q22, Cu)

193-N. Improvement of the Characteristics of Cast Iron by Modification of the Graphite. (In French.) *Métallurgie et la Construction Mécanique,* v. 83, May 1951, p. 351-355.

Acicular graphite is changed to the nodular form. Research was carried out by studying the liquefaction of the phase in which graphite is soluble, and the condition in which it precipitates. 17 photomicrographs. (N8, CI)

194-N. Theory of Grain Boundary Migration Rates. David Turnbull. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 661-665.

The relation between grain-boundary migration rates and diffusion coefficients is derived on the basis of the absolute reaction-rate theory. An explanation for the unexpectedly large entropy of activation in boundary-migration processes is given based on the concept that inclusions retarding boundary migration become less effective at elevated temperature due to their solution and coalescence. 32 ref. (Ni, P12)

195-N. Fundamental Aging Effects Influencing High-Temperature Properties of Solution-Treated Inconel X. D. N. Frey, J. W. Freeman, and A. E. White. *National Advisory Committee for Aeronautics,* Technical Note 2385, June 1951, 71 pages.

Studies were made of the effects of various aging treatments on the mechanical properties of solution-treated Inconel X at 1200 and 1500° F. for rupture times of 0.1 to 1000 hr. Specimens were aged at 1200, 1400, and 1600° F° for time periods up to 1000 hr. Microstructure analyses of the aged specimens were made by means of X-ray diffraction studies and optical and electron-micrographic examinations. Correlations of the mechanical properties with the structural analyses were made with the aid in part of mathematical analyses. (N7, Q4, Ni)

196-N. Solidification of Cast Iron. (In French.) Marcel Cuédras. *Métallurgie et la Construction Mécanique,* v. 83, Apr. 1951, p. 243, 245, 247.

Reviews the process and proposes new hypothesis for formation of graphite. (N12, N8, Fe)

197-N. Electron Diffraction Study of Iron Cementation. (In French.) J. J. Trillat and S. Oketani. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 289-295.

Previously abstracted from *Comptes Rendus* (France). See item 184-N, 1950. (N8, J28, Fe)

198-N. Relation Between the Deformation and Recrystallization of Monocrystals of Aluminum. (In French.) A. Laloeuf and Ch. Crussard. *Revue de Métallurgie,* v. 48, June 1951, p. 462-470; disc., p. 470.

Deformation is shown to depend on crystal-orientation; rotation is an essential factor in consolidation. In recrystallization, the germ is a portion of crystal which has undergone rotation about two axes, resulting from two abnormal slippings. 14 ref. (N5, Q24, Al)

199-N. Epitaxial Growth of Iron Protoxide Crystals by Careful Oxidation of Iron at High Temperatures. (In French.) Jacques Bénard and Jean Bardolle. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, June 11, 1951, p. 2217-2218.

Describes above for low pressures and shows that it favors a relationship of orientation between the oxide and the metal beneath, permits formation of epitaxial layers of notable thickness and with characteristic geometric form, and makes evident some inequalities in rate of growth. (N3, R2, Fe)

200-N. The Rate of Precipitation of Highly Pure Zinc-Aluminum and Zinc-Copper Solid Solutions. (In German.) Wilhelm Hofmann and Gudrun Fahrenhorst. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 460-462.

Solubilities of Al and Cu in Zn were investigated by the X-ray method at temperatures down to room temperature, and precipitation of supersaturated solid solutions was determined by X-ray and dilatometric methods. Experimental procedure and data. (N7, Zn, Al, Cu)

201-N. The Solubility of Copper and Manganese in Solid Aluminum. (In German.) Wilhelm Hofmann. *Zeit-*

schrift für Metallkunde, v. 42, Dec. 1950, p. 477-479.

Studied by means of resistance measurements and metallographic methods. Sections through the Cu-Mn-Al system at 610, 525, and 400° C. were designed and distinct points of concentration shown in graphic form. (N12, Cu, Mn, Al)

202-N. Carbon in Platinum. (In German.) Hans König. *Naturwissenschaften,* v. 38, 1st Apr. No., 1951, p. 154-155.

Reviews published literature on solubility of C in Pt. 10 ref. (N12, Pt)

203-N. Black Selenium. IV. The Structure of Amorphous Selenium and Its Catalytic Transformation into Hexagonal Crystallized Selenium. (In German.) H. Krebs. *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 265, June 1951, p. 156-168.

While the annular nature of amorphous Se impedes its crystallization into hexagonal phase, it is shown that certain reagents facilitate splitting of ring molecules and thus act as catalysts in the crystallization process. 25 ref. (N2, Se)

204-N. Grain-Boundary Energies in Silver. A. P. Greenough and Ronald King. *Journal of the Institute of Metals,* v. 79, Aug. 1951, p. 415-427.

Variation of grain-boundary energy with angle between the crystals meeting at the boundary was investigated for Ag by examination of boundary grooves formed during thermal etching. Results are found to be in fair agreement with theoretical predictions based on treatment of the boundary as a region of transition represented by an assembly of dislocations. 16 ref. (N3, P12, Ag)

205-N. The Study of Recrystallization in Zinc by Direct Observation. G. Brinson and A. H. W. Moore. *Journal of the Institute of Metals,* v. 79, Aug. 1951, p. 429-438.

Specimens of deformed Zn were observed under a polarizing microscope while being heated. Changes in the crystal structure during recrystallization were continuously observed and photographed. Shows that growth of new crystals is very erratic, and although grain and twin boundaries, inclusions, and local inhomogeneities sometimes markedly affect growth, at other times they have no influence on it. The method of observation can be applied to any non-cubic metal that will undergo structural nonalterations at a temperature suitable for microscopic observation. 11 ref. (N5, M21, Zn)

206-N. White-to-Grey Tin Formation in Refrigeration Equipment. Herbert S. Kalish. *Materials & Methods,* v. 34, Aug. 1951, p. 136, 138.

Transformation which occurs erratically at low temperatures, resulting in formation of a powdery substance, and consequent failure of the equipment. (N6, Sn)

207-N. New Segregation Phenomena in Metals. M. T. Stewart, R. Thomas, K. Wauchope, W. C. Winegard, and B. Chalmers. *Physical Review,* ser. 2, v. 83, Aug. 1951, p. 657.

Pb-Bi alloys containing radioactive Bi were examined for segregation of the Pb resulting from the decay of Bi^{210}. Three types of segregation were established; crystal-boundary segregation; surface segregation; and inhomogeneous crystallization. (N12, Pb, Bi)

208-N. Analogies Between Steels and Aluminium Bronzes. H. Laplanche. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A224-A241; disc., p. A241-A250.

Previously abstracted from *Institute of British Foundrymen.* (Paper No. 977). See item 164-N, 1950. (N8, N9, ST, Cu)

209-N. Recovery and Cold Working of 52S Commercial Aluminum Alloy. Gerard H. Boss. *Transactions of American Society for Metals,* v. 43, 1951, p. 122-140; disc., p. 140-141.

Previously abstracted from *American Society for Metals,* Preprint 6, 1950. See item 203-N, 1950. (N4, N5, Q24, Al)

210-N. Transformations in Ferritic Chromium Steels Between 1100 and 1500° F. (595 and 815° C.) F. J. Shortsleeve and M. E. Nicholson. *Transactions of American Society for Metals,* v. 43, 1951, p. 142-156; disc., p. 156-160.

Previously abstracted from *American Society for Metals,* Preprint 10, 1950. See item 204-N, 1950. (N8, AY)

211-N. Hardening of High-Chromium Steels by Sigma Phase Formation. John J. Gilman. *Transactions of American Society for Metals,* v. 43, 1951, p. 161-187; disc., p. 187-192.

Previously abstracted from *American Society for Metals,* Preprint 11, 1950. See item 205-N, 1950. (N8, SS)

212-N. Sigma-Phase Formation in a Wrought Heat Resisting Steel. Ahmed El Bindari, P. K. Koh, and Otto Zmeskal. *Transactions of American Society for Metals,* v. 43, 1951, p. 226-236; disc., p. 236-242.

Previously abstracted from *American Society for Metals,* Preprint 13, 1950. See item 206-N, 1950. (N8, SS, SG-h)

213-N. Formation of Austenite in High-Chromium Stainless Steels. C. B. Post and W. S. Eberly. *Transactions*

of American Society for Metals, v. 43, 1951, p. 243-256; disc., p. 256-259.

Previously abstracted from *American Society for Metals,* Preprint 14, 1950. See item 207-N, 1950. (N8, SS)

214-N. Influence of Austenitizing Time and Temperature on Austenite Grain Size of Steel. O. O. Miller. *Transactions of American Society for Metals,* v. 43, 1951, p. 260-287; disc., p. 287-289.

Previously abstracted from *American Society for Metals,* Preprint 15, 1950. See item 208-N, 1950. (N3, J22, AY, CN)

215-N. Carbide Precipitation in Type 304 Stainless Steel—An Electron Microscope Study. E. M. Mahla and N. A. Nielsen. *Transactions of American Society for Metals,* v. 43, 1951, p. 290-314; disc., p. 314-322.

Previously abstracted from *American Society for Metals,* Preprint 16, 1950. See item 209-N, 1950. (N8, M21, SS)

216-N. Some Aspects of Graphitization in Steel. G. V. Smith, J. A. MacMillan, and E. J. Dulis. *Transactions of American Society for Metals,* v. 43, 1951, p. 692-711; disc., p. 711-717.

Previously abstracted from *American Society for Metals,* Preprint 17, 1950. See item 210-N, 1950. (N8, AY)

217-N. Kinetics of the Austenite Transformation in Certain Alloy Steels. Edward A. Loria. *Transactions of American Society for Metals,* v. 43, 1951, p. 718-733.

Results obtained in an investigation of isothermal transformation characteristics and structural features of complex alloy steels are described. TTT-diagrams of six commercial steels arranged in two groups. In one group are three Ni-Cr-Mo steels of 4.84-5.0% total alloy content and in the other are three Cr-Mo-Mn steels of 2.47-2.66% total alloy content. The TTT-diagrams show a complete break, or region of relatively stable austenite, between the pearlite and bainite transformations. Top of the bainite range is marked by a horizontal shelf extending to short reaction times, and effects of carbon and alloy contents on time for initial decomposition at any temperature are clearly indicated. 10 ref. (N8, AY)

218-N. The Determination of Solidus Temperatures in Magnesium Alloys by Dilatometric Measurements. Heinrich Adenstedt and Jay R. Burns. *Transactions of American Society for Metals,* v. 43, 1951, p. 873-886; disc., p. 887.

Previously abstracted from *American Society for Metals,* Preprint 28, 1950. See item 211-N, 1950. (N12, Mg)

219-N. An Investigation of the Role of Aluminum in the Graphitization of Plain Carbon Steel. A. M. Hall and E. E. Fletcher. *Transactions of the American Society of Mechanical Engineers,* v. 73, Aug. 1951, p. 743-749; disc., p. 749-750.

The role of Al in the breakdown of iron carbide in plain carbon steels into Fe and graphite at temperatures below the lower critical point of the steel. 14 ref. (N8, CN, Al)

220-N. Effect of Prior Treatment on Precipitation of Sigma Phase. G. V. Smith, E. J. Dulis, and H. S. Link. *Welding Journal,* v. 30, Aug. 1951, p. 385s-396s.

Effect of heating between 1700 and 2300° F. after cold deformation, and of cooling rate therefrom, on the formation of sigma phase in 18-8 Cr-Ni-Cb and 25-20 Cr-Ni stainless steels during subsequent exposure at 1300° F. for up to 7500 hr. (N8, SS)

221-N. Homogenization of Dendrite Segregations of Phosphorus and Arsenic in Carbon Steels. (In French.) Andre Kohn. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, July 9, 1951, p. 178-180.

Usefulness of autoradiograph method for above. Suitable annealing provides for diffusion of P in the metal, though that of As is more difficult to obtain. (N1, CN)

222-N. Solid-State Reactions in Phase Equilibrium Research. I. Wilfrid R. Foster. *American Ceramic Society Bulletin,* v. 30, Aug. 15, 1951, p. 267-270.

Wider use of solid-state reactions by ceramists and others engaged in phase-equilibrium research is recommended. General principles for systematic application of this method are outlined. 46 ref. (To be continued.) (N general)

223-N. Physical Factors Affecting Order in Metallic Systems. C. E. Birchenall. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 144-160.

Order in metallic systems is reviewed as a dynamic balance between ordering and disordering tendencies. Several types of order and disorder are identified and associated with states or properties of the system of which they form an inextricable part. 32 ref. (N10)

224-N. Heterogeneous Nucleation. J. H. Hollomon. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 161-177.

By nucleation is meant the formation of a new and distinct region separated from its surroundings by a discrete boundary. Theory of homo-

geneous nucleation, and of heterogeneous nucleation. Characteristics of the latter as applied to solidification of metallic and nonmetallic melts. 38 ref. (N2)

225-N. Phenomena Accompanying Precipitation From Solid Solution of C and N in Alpha-Iron. Charles Wert. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 178-200.

A method of studying precipitation in the Fe-C and Fe-N systems, interpretation of experiments carried out in this manner, and an investigation of changes in some of the electrical and mechanical properties which occur during precipitation. (N7, Fe)

226-N. Eutectoid Decompositions. J. C. Fisher. *American Society for Metals, 1950,* "Thermodynamics in Physical Metallurgy," p. 201-241.

When a single solid phase transforms to two or more new solid phases upon cooling, or isothermally after quenching, the process is termed "eutectoid decomposition." The term "eutectoid" is applied both to the parent solid solution and to the structures resulting from transformation. The pearlite, martensite, and bainite transformations in eutectoid steels are described quantitatively in terms of the nucleation and growth of new phases. It is believed possible to extend this analysis to other eutectoids, as the required thermodynamic and elastic properties, diffusion rates, and interfacial tensions become known. 41 ref. (N8, N9, ST)

227-N. Thermodynamics of the Martensitic Transformation. Morris Cohen, E. S. Machlin, and V. G. Paranjpe. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," p. 242-270.

General characteristics of the martensite transformation, decrease in free energy accompanying the transformation, nonchemical factors involved, thermodynamics of shear and dislocations as strain embryos. Correlates theory with experiment. 29 ref. (N8, P12, ST)

228-N. A Nucleation Problem in Ferromagnetism. Lieuwe J. Kijkstra. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 271-281.

After discussion of preferred directions for the magnetization vector I^s and of domain boundaries, the following problem is posed. "Under what conditions and by what process do those stable nuclei of reversed magnetization arise in a matrix which is homogeneous with regard to stress, magnitude and direction of the magnetization?" Two possible solutions. (N2, P16)

229-N. Principles of Solidification. David Turnbull. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 282-306.

How the general theory of nucleation applies to the nucleation of crystals, particularly in liquids. Experimental results on the rate of crystal nucleation appear to be confusing and contradictory. However, many of the apparent contradictions can be resolved if the role of extraneous influences (such as heterogeneities and container walls), is properly considered. Results furnish clues to solution of the problem of interfacial energies involving solid phases. Such data also should be valuable in evaluating theories dealing with the relation between the structure of liquids and solids. 41 ref. (N2)

230-N. Interstitial Diffusion. Part I. Analysis of Experimental Data. A. G. Guy. *American Society for Metals,* Preprint 6, 1951, 22 pages.

The data of Wells, Batz, and Mehl on the interstitial diffusion of carbon in austenite are employed in obtaining empirical evidence for the hypothesis that an activity diffusion coefficient, which is independent of solute concentration, adequately describes diffusion phenomena. A step-by-step method of solving diffusion equations is described. Smith's data on steady-state diffusion of carbon are plotted in terms of activities. The results tend to support the hypothesis that activity diffusion coefficients are independent of concentration. 13 ref. (N1)

231-N. Chromium Diffusivity in Alpha Cobalt-Chromium Solid Solutions. John W. Weeton. *American Society for Metals,* Preprint 8, 1951, 14 pages.

Previously abstracted from *National Advisory Committee for Aeronautics,* Technical Note 2298, Nov. 1950, 42 pages. See item 1-N, 1951 (N1, Co, Cr)

232-N. Anisothermal Diffusion of Carbon in Austenite. Joseph E. Black and Gilbert E. Doan. *American Society for Metals,* Preprint 9, 1951, 9 pages.

The problem of anisothermal diffusion, wherein a constant temperature gradient is maintained along with the linear diffusion axis, was investigated. Experimental application is made to the diffusion system, carbon in austenite, at an interface temperature of 1800° F. The mathematical treatment is based upon Fick's fundamental partial differential equation and the Arrhenius exponential temperature function. Evidence indicates that, for moderate temperature gradients in austenite, there are but small depar-

tures between anisothermal and classical isothermal carbon-diffusion penetrations. (N1, ST)

233-N. The Formation of Sigma Phase in 13 to 16% Chromium Steels. H. S. Link and P. W. Marshall. *American Society for Metals,* Preprint 11, 1951, 12 pages.

After severe cold reduction, sigma phase was formed at 1050 and 900° F. in 16, 15, and 14% Cr steels and at 900° F. in a 13% Cr steel. The fact that the increase in hardness of each of the prior annealed Cr steels during heating at 900° F. is apparently related to the amount of sigma phase formed in the steel supports the theory that so-called "885° F. embrittlement" is caused by incipient sigma-phase precipitation. (N6, M24, SS)

234-N. Composition Limits of Sigma Formation in Nickel-Chromium Steels at 1200° F. (650° C.). M. E. Nicholson, C. H. Samans, and F. J. Shortsleeve. *American Society for Metals,* Preprint 13, 1951, 19 pages.

Using X-ray diffraction techniques and cold worked filings, in order to accelerate the approach to equilibrium conditions, sigma formations were studied in low-carbon stainless steels in the range of nominal compositions. The composition limits were found to be almost 5% lower in Cr content than given by the diagram of Schafmeister and Ergang. Effects of variation in amounts of alloying elements were determined. (N6, M24, SS)

235-N. Ferrite Formation Associated With Carbide Precipitation in 18 Cr-8 Ni Austenitic Stainless Steel. E. J. Dulis and G. V. Smith. *American Society for Metals,* Preprint 14, 1951, 12 pages.

Experiments employing the microscope, X-ray diffraction, and magnetic measurements, the latter two at elevated as well as at room temperature, indicate that the ferrite which forms 18-8 as a consequence of heating in the "sensitizing" temperature range does so largely during cooling from this range rather than at the sensitizing temperature. (N8, SS)

236-N. Isothermal Transformation, Hardening, and Tempering of 12% Chromium Steel. R. L. Rickett, W. F. White, C. S. Walton, and J. C. Butler. *American Society for Metals,* Preprint 17, 1951, 31 pages.

The 11 steels investigated, representing AISI Types 403, 410, and 416, contained 0.016-0.14% and 11.3-13.25% Cr. Three of these steels contained approximately 0.5% Mo, boron had been added to one, and another contained Zr. Al temperatures were determined, and other data on austenite formation in these steels were obtained; transformation characteristics of the austenite were investigated. The effect of tempering, after normalizing or quenching, was also investigated. 12 ref. (N8, J26, J29, SS)

237-N. Effects of Decomposition of Retained Austenite During Tempering on Notch Toughness and Tensile Properties. E. F. Bailey and W. J. Harris, Jr. *American Society for Metals,* Preprint 19, 1951, 12 pages.

SAE 2340 steel was quenched below M_S so that less than 1, 10, 40, 70 and 90% austenite would be present after quench. The retained austenite decomposition during tempering at 600, 800, 900, and 1050° F. was studied metallographically for type of product and time for completion of decomposition. 40% or less resulted in an acicular-type structure at all tempering temperatures studied; 70% or more resulted in producing some primary ferrite and pearlite at the high tempering temperatures studied. Impact and tensile properties of primary isothermal decomposition products are included. (N8, Q6, Q27, AY)

238-N. Comparison of the Effects of Alloying Elements on the Lower and Upper Transition Temperatures in Pearlitic Steels. J. A. Rinebolt and W. J. Harris, Jr. *American Society for Metals,* Preprint 20, 1951, 12 pages.

A lower transition was established by finding the temperature at which brittle cracking occurred without plastic bending of Charpy V-notch bars. Comparison of the effects of alloying elements on the lower and the upper transitions revealed that C has less effect on the lower than on the upper, and that Si up to 1.03% decreases the lower while it increases the upper. (N8, Q6, CN, AY)

239-N. Strain Aging Effects. J. D. Lubahn. *American Society for Metals,* Preprint 25, 1951, 22 pages.

Utilizes new data and data from the literature to form a coherent picture which relates various strain-aging effects to one another. The results are primarily of phenomenological importance, but they clarify the facts that a mechanistic treatment must ultimately explain. The evidence suggests that four mechanical effects—strengthening of a strained metal during heating, appearance of a yield point in a strained metal after heating, discontinuous flow, and abnormally low rate sensitivity—occur together in many common metals and are most pronounced at the same temperature. The evidence also suggests that

strain aging in a precipitation-hardening alloy is related to the capacity for further precipitation. 15 ref. (N7)

240-N. Stress-Induced Transformation of Retained Austenite in Hardened Steel. B. L. Averbach, S. G. Lorris, and M. Cohen. *American Society for Metals,* Preprint 28, 1951, 11 pages.

Transformation in tapered tensile bars of hardened and tempered AISI 2340 steel was studied as a function of distance from the fracture. The as-hardened material originally contained 6% retained austenite. After the test, complete transformation of the retained austenite was found at the fracture and some transformation was detected in all sections where plastic strain had occurred. The retained austenite was completely converted before necking was observed. Determinations were also made of retained austenite as a function of distance from the fracture of V-notch slow-bend and Charpy impact bars. (N8, AY)

241-N. Kinetics of Ordering in the Alloy AuCu. G. J. Dienes. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1020-1026.

Electrical resistivity was used as the index of order. A purely phenomenological analysis of isothermal resistivity-time curves showed that ordering in this alloy is a process characterized by a single constant activation energy of 29 kcal. The ordering process is described by a simple third-order rate equation with all the kinetic constants fully evaluated. 15 ref. (N10, Au, Cu)

242-N. X-Ray Detection of Long-Range Order in Ni_2Mn. B. L. Averbach. *Journal of Applied Physics,* v. 222, Aug. 1951, p. 1088-1089.

How a melt containing 25.5 atomic % Mn was prepared from electrolytic Mn and Mond Ni. The ingot was homogenized at 1000° C., quenched and cold reduced 94% to 1.5-mm. wire. The specimen was ordered by heating to 600° C. and cooling at 20° C. per hr. in the range 600-500° C. and 20° C. per day from 500 to 300° C. X-ray diffraction photograms were made with FeKα radiation in a Debye camera. (N10, Ni, Mn)

243-N. Grain Structure of Alumium-Killed, Low Carbon Steel Sheets. R. L. Solter and C. W. Beattie. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 721-726.

Experiments show that the substance mechanically obstructing grain growth is AlN. The effectiveness of AlN in inhibiting grain growth was found to be influenced by the degree of cold reduction, the rate of heating in annealing, the thermal history of the sample before cold reduction, and the residual Al content. A correlation between grain shape and austenitic grain-coarsening temperature also was indicated and additional experiments demonstrated that AlN is also the principal cause for the fine grain characteristics of Al-killed steels. (N3, M27, CN)

244-N. Isothermal Formation of Martensite at Subzero Temperatures in a High Chromium Steel. S. C. Das Gupta and B. S. Lement. *Journal of Metals,* v. 3, Sept. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 727-731.

The transformation of austenite to martensite is generally believed to occur only on cooling. Investigation of a 15% Cr steel indicated that isothermal formation of martensite occurs between 65 and −197° C. and is always preceded by some athermal transformation. By rapid cooling, the isothermal, but not the athermal, component of transformation can be suppressed. Stabilization against isothermal transformation can be induced by cycling from below the Ms point to room temperature. 10 ref. (N8, SS)

245-N. Burst Phenomenon in the Martensitic Transformation. E. S. Machlin and Morris Cohen. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 746-754.

Experiments were devised to test the athermal embryo and strain embryo theories of martensite nucleation. Results, using single crystals and polycrystals of 70 Fe+30 Ni alloys, indicate that internal strains, either within the virgin austenite or around existing martensitic plates, control the nucleation process in these alloys. Furthermore, the growth of martensitic plates is not limited by the attainment of an elastic balance with the austenitic matrix, but by the occurrence of plastic deformation at the martensite boundaries which interferes with the propagation mechanism. 14 ref. (N2, N8, Fe)

246-N. Effect of Rate of Cooling on the Alpha-Beta Transformation in Titanium and Titanium-Molybdenum Alloys. Pol Duwez. *Journal of Metals,* v. 3, Sept. 1951; *Tarnsactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 765-771.

The effect of the rate of cooling on Ti, Zi, and Tl was measured. For Ti-Mo alloys, it was shown that for Mo concentrations up to 8%, the rate of cooling has no effect on the transformation temperature, but this temperature decreases progressively with increasing Mo content. 18 ref. (N6, Ti, Mo)

247-N. Constitution and Precipitation-Hardening Properties of Copper-Rich Copper-Tin-Beryllium Alloys. R. A. Cresswell and J. W. Cuthbertson. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 782-791.

Isothermal sections of the ternary Cu-Sn-Be system were determined by microscopic methods for alloys in equilibrium at 700, 600, 580, 400, and 300° C. for the ranges 0.25-3.0% Be and 1.5-13.5% Sn. The decrease in the limit of a solid solubility with fall in temperature was found to be more marked than indicated by previous investigators. The presence of the ε phase of the Cu-Sn system in specimens annealed at 300° C. for 8 weeks was confirmed by X-ray examination. Effects of aging and constitution changes taking place during precipitation heat treatment were examined. (N7, M24, Cu)

248-N. Solidification of Lead-Tin Alloy Droplets. J. H. Hollomon and D. Turnbull. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 803-805.

The solidification of Pb-Sn alloy droplets (30 to 50-micron diam.) was observed as a function of composition by a microscopic technique. Evidence is given that the lead-rich crystalline phase has a mild catalytic effect on the formation of nuclei for the growth of the Sn-rich solid solutions. (N12, Pb, Sn)

249-N. Precipitation of Carbon and Nitrogen in Cold-Worked Alpha-Iron. S. Harper. *Physical Review,* ser. 2, v. 83, Aug. 15, 1951, p. 709-712.

The strain-induced precipitation of C and N_2 from supersaturated solution in α-Fe is shown to be in agreement with a dislocation mechanism. Estimates of the dislocation density required to produce the observed precipitation rates are in agreement with dislocation theory. Activation energies involved were found to be in agreement with published data for activation energies of diffusion of the two solutes. 14 ref. (N7, Fe)

250-N. Position of the A_{r111} Point in Nickel-Chromium Stainless Steels and Its Displacement by Cold Working. (In French.) Paul Bastien and Jacques Bedieu. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, July 21, 1951, p. 49-51.

Character of the thermal martensite transformation and displacement of A_{r111} point in austenite. (N8, SS)

251-N. Cementation of Single Crystals of Iron. (In French.) Jean-Jacques Trillat and Shigueo Oketani. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, July 2, 1951, p. 51-53.

Behavior of crystals when cementation occurs in presence of CO + H_2. (N1, Fe)

252-N. Critical Considerations in the Formation Mechanism of Graphite Nodules. (In French.) J. de Vidts and A. de Sy. *Revue de Métallurgie,* v. 48, July 1951, p. 547-551.

Brief review article. (N8, CI)

253-N. Magnetic Study of Fe-C-N Alloys. (In French.) J. Pomey, R. Coudray and J. Moulin. *Revue de Métallurgie,* v. 48, July 1951, p. 552-560.

Results of extensive study of the Fe-rich portion of the Fe-C-N system and its transformations, made in order to shed more light on the carbonitriding process for case hardening of steel. Thermomagnetic method used, apparatus, and photomicrographs. (N8, J28, ST).

254-N. Solid-State Reactions in Phase Equilibrium Research. II. (Concluded.) Wilfrid R. Foster. *American Ceramic Society Bulletin,* v. 30, Sept. 15, 1951, p. 291-296.

The preceding part included a discussion of solid-state reactions in two-component systems. Part II presents a study of the three-component and multicomponent systems. (N general)

255-N. The Allotropic Transformation of Hafnium. Pol Duwez. *Journal of Applied Physics,* v. 22, Sept. 1951, p. 1174-1175.

The existence of an allotropic transformation in hafnium, suggested by Zwikker in 1926, is confirmed. The transformation temperature is 1310 ± 10° C. The high-temperature beta form is believed to be body-centered cubic. (N6, Hf)

256-N. A Reinterpretation of Experiments on Intermetallic Diffusion. A. S. Nowick. *Journal of Applied Physics,* v. 22, Sept. 1951, p. 1182-1186.

Reported values for the heat of activation, for volume chemical diffusion, as obtained from the slope of the best straight line in a semiloga-

rithmic plot of diffusion data vs. reciprocal of temperature, may often be greatly in error. A method is presented which attempts to avoid such errors by using the calculated values of Zener for the intercept of the straight line. 20 ref. (N1)

257-N. On the Orientations of Zinc Crystals Produced by the Bridgman Method. L. M. Slifkin. *Journal of Applied Physics,* v. 22, Sept. 1951, p. 1216.

The effect that the geometry of a crucible can have on the orientation of crystal growth. (N12, M26, Zn)

258-N. Diffusion of Copper in Aluminium in the Presence of Calcium. Mladen Paic. *Metal Treatment and Drop Forging,* v. 18, Sept. 1951, p. 395-399.

Previously abstracted from *Revue de Métallurgie.* See item 107-N, 1951. (N1, Al, Cu)

259-N. The Formation of Sigma Phase in 17 Per Cent Chromium Steel. J. J. Heger. *American Society for Testing Materials,* "Symposium on the Nature, Occurrence, and Effects of Sigma Phase," 1951, p. 75-78; disc., p. 79-81.

Previously abstracted from *American Society for Testing Materials,* Preprint 53, 1950. See item 148-N, 1950. (N8, SS)

260-N. Structural Transformations in the Tempering of High-Carbon Martensitic Steels. K. H. Jack. *Journal of the Iron and Steel Institute,* v. 169, Sept. 1951, p. 26-36.

X-ray investigations on the nature of the 1st and 3rd stages which are associated with decomposition of martensite into ferrite and cementite. 33 ref. (N8, J29, ST)

261-N. Effects of Tungsten or Molybdenum Upon the Alpha-Beta Transformation and Gamma Precipitation in Cobalt-Chromium Alloys. E. E. Fletcher and A. R. Elsea. *Journal of Metals,* v. 3, Oct. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 897-902.

Metallographic investigation shows that W has little effect upon the α-β transformation temperature range, while Mo tends to raise it. Both elements tend to promote the formation of γ phase, Mo being more potent in this respect than W. (N6, N7, Co, Cr)

262-N. Isothermal Transformation and Properties of a Commercial Aluminum Bronze. A. H. Kasberg, Jr., and David J. Mack. *Journal of Metals,* v. 3, Oct. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 903-908.

The isothermal transformation diagram of the alloy was first determined. On this basis, the heat treatments necessary to produce representative structures were selected and mechanical properties determined. 14 ref. (N9, Q general, Cu)

263-N. Experimental Evidence for the Vacancy Mechanism in Diffusion in Metals and Alloys. Foster C. Nix and Frank E. Jaumot, Jr. *Physical Review,* ser. 2, v. 83, Sept. 15, 1951, p. 1275-1276.

There has been much discussion as to the possibility of using an alloy system such as Fe-Al, Ni-Al, or Co-Al, near the 50-50 at. % composition, to test the vacancy theory of diffusion. Investigations on the diffusion of Co-Al alloys. (N1, Co, Al)

264-N. The Macromosaic Structure of Tin Single Crystals. E. Teghtsoonian and Bruce Chalmers. *Canadian Journal of Physics,* v. 29, Sept. 1951, p. 370-381.

Single crystals of high-purity Sn grown from the melt by modified Bridgman method are shown to be partitioned into bands, or striations. Properties of the striations are shown to be dependent on both rate of growth and crystallographic orientation relative to the direction of heat flow: A tentative explanation in terms of formation of edge-type dislocations from condensation of vacant lattice sites. 14 ref. (N12, M26, Sn)

265-N. Dendritic Growth in Lead. F. Weinberg and Bruce Chalmers. *Canadian Journal of Physics,* v. 29, Sept. 1951, p. 382-392.

Dendritic growth was revealed by decanting the remaining liquid at various stages of solidification. Direction of growth was determined as a function of crystallographic orientation and direction of solidification. An explanation is advanced for the presence of the substructure in terms of dendritic growth based on observed properties. (N12, Pb)

266-N. A Unified Picture of Diffusion. J. D. Babbitt. *Canadian Journal of Physics,* v. 29, Sept. 1951, p. 427-436.

Applies the fundamental equation developed earlier to diffusion in liquid and solid solutions and shows that this equation leads to the same expression as current theories of such diffusion. Application to diffusion of a solute into a solvent when the latter is stationary, to diffusion of metals in metals, and to diffusion of gases through adsorbing solids. (N1)

267-N. Note on the Solubility of Iron in Lquid Magnesium-Aluminum

Alloys. W. A. Baker and M. D. Eborall. *Metallurgia,* v. 44, Sept. 1951, p. 145-146.
Experimental procedure, graph and table of solubility, and discussion of results. (N12, Mg, Al, Fe)

268-N. Graphitization of Steel. A. M. Hall and H. M. Banta. *Oil and Gas Journal,* v. 50, Oct. 11, 1951, p. 101-102, 105-106.
Graphitization has caused several spectacular failures in steam lines and the same phenomenon may be present in petroleum refining, especially in catalytic cracking. Briefly explains the phenomenon of graphitization and information applicable to the petroleum refining industry. (N8 ST)

269-N. Diffusion in Grain Boundaries and Their Structure. M. R. Achter and R. Smoluchowski. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1260-1264.
See abstract of "Anisotropy of Diffusion in Grain Boundaries," *Physical Review,* item 171-N, 1951. (N1, Ag, Cu)

270-N. Preferred Orientation in Zirconium. R. K. McGeary and B. Lustman. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 994-1002.
Previously abstracted from *U. S. Atomic Energy Commission.* See item 104-N, 1951. (N5, Q24, Zr)

271-N. Grain-Growth and Recrystallization Characteristics of Zirconium. F. J. Dunkerley, F. Pledger, V. Damiano, and J. Fulton. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1003-1008; disc. p. 1008.
A commercially pure Zr prepared by the iodide process was used. Grain growth from 40 to 800° C. was continuous once initiated. Recrystallization occurred at 450 to 550° C. after deformations of 20 and 50%. Relative rates of recrystallization obtained are useful as a guide in fabrication practice. (N3, N5, Zr)

272-N. Habit Phenomenon in the Martensitic Transformation. E. S. Machlin and Morris Cohen. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1019-1029.
Mathematical analysis as applied to 70-30 Fe-Ni alloys, plus experimental verification on single crystals grown from the melt. Results are shown by tables, graphs, and photomicrographs. 10 ref. (N8, N12, Fe)

273-N. Crystal Structures and Transformations in Indium-Thallium Solid Solutions. *Journal of Metals,* v. 3, Nov. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 1951, p. 1056-1057.
Discussion of above paper (by Lester Guttman). (Dec. 1950 issue, see item 271-N, 1950.) (N9, M24, In, Tl)

274-N. Crystallography of Cubic-Tetragonal Transformation in the Indium-Thallium System. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1057-1060.
Discussion of above paper (by J. S. Bowles, C. S. Barrett, and L. Guttman). (Dec. 1950 issue, see item 272-N, 1950.) (N9, N1, M24, In, T1)

275-N. Interface and Marker Movements in Diffusion in Solid Solutions of Metals. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1060-1062.
Discussion of above paper (by Luiz C. Correa da Silva and Robert F. Mehl). (Feb. 1951 issue, see item 43-N, 1951.) (N1, Cu, Ag, Au)

276-N. Formation of Annealing Twins. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1068-1070.
Discussion of above paper (by J. E. Burke). (Nov. 1950 issue, see item 255-N, 1950.) (N5)

277-N. Note on Superlattices and Brillouin Zones. J. C. Slater. *Physical Review,* ser. 2, v. 84, Oct. 15, 1951, p. 179-181.
Theoretical discussion illustrated by several examples, especially Cu-Pt and Cu-Au alloys. Similarity of effects described to current theories of antiferromagnetism and of superconductivity. (N10, P16, Cu, Pt, Au)

278-N. Application of Radioactive-Tracer Technique to the Study of Diffusion in Solids. (In French.) Jean-Claude Hutter. *Bulletin de la Société Chimique de France,* July-Aug. 1951, p. 45D-52D.
Reviews and critically discusses literature on the technique and the results obtained. 94 ref. (N1, S19)

279-N. Multiple-Phase Diffusion and Its Metallurgical Application. (In French.) H. Bückle and J. Descamps. *Revue de Métallurgie,* v. 48, Aug. 1951, p. 569-578.
Investigated for a couple formed by high-purity Al and an Al-Be alloy, which latter is an aggregate of Be dispersed in a solid solution of Al-Be. Theoretical and experimental aspects of a new method; results are interpreted. 19 ref. (N1, Al, Be)

280-N. The Three Mechanisms of Carbonitriding and Hardening. (In French.) Jacques Pomey, Francois Goutel, André Veragen, and René Le Roux. *Revue de Métallurgie,* v. 48, Sept. 1951, p. 665-680.

As applied to various stainless and low-alloy steels. The three mechanisms are: cementation in the austenite state, followed by bainite hardening of the core; carbonitriding above the A_{cf} point followed by the pearlitic Ar′ transformation of the interior metal; and cementation in the alpha state. Results of the various processes. (N8, J26, J28, SS, AY)

281-N. Some Particular Questions on the Modern Thermal Treatment of Steels. (In French.) Andre Michel. *Revue Universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 94, Sept. 1951, p. 281-293.

Reviews literature. Relationship between the isothermal and anisothermal transformation curves of austenite, stabilization of austenite by aging, and application of S-curves to thermal treatment. (N8, ST)

282-N. Research on the Austenite Transformation of Supercooled Alloyed Structural Steels. (In German.) Helmut Krainer and Max Kroneis. *Archiv für das Eisenhüttenwesen,* v. 22, July-Aug. 1951, p. 231-243; disc., p. 243-244.

Study was made on six structural steels alloyed with small percentages of Si, Mn, Cr, V, and Mo. Photomicrographs are arranged in their respective locations on time-temperature curves (S-curves) (N8, AY)

283-N. Research on Isothermal Austenite Transformation Upon Supercooling. (In German.) Erich Greulich. *Archiv für das Eisenhüttenwesen,* v. 22, July-Aug. 1951, p. 245-257, disc., p. 257-260.

Experiments made to study the isothermal austenite transformation of nine plain-carbon and six alloy steels quenched to 150° C. for different times. 26 ref. (N8, CN, AY)

284-N. Recrystallization Tests With a Commercial Al-Cu-Mg Alloy During Intermittent Heat Treatment. (In German.) E. Mohr. *Metall,* v. 5, Aug. 1951, p. 328-331.

In tests made by brief annealing at high furnace temperatures, special attention was paid to temperature gradient in test sample. Strength measurements were made to determine effect of spontaneous recrystallization on mechanical properties in the heterogeneous state. The alloy investigated contained 3.43% Cu and 0.59% Mg. (N5, Al)

285-N. Mobility in the Diffusion of Metallic Ternary Systems. (In German.) W. Seith and H. Wever. *Zeitscrift für Elektrochemie und angewandte Physikalische Chemie,* v. 55, July 1951, p. 380-384.

Since mobility rather than concentration gradient is the factor causing diffusion, it is proposed that irregular concentration-diffusion curves be replaced by mobility-diffusion curves. Data on diffusion of different elements in several carbon and alloy steels. 18 ref. (N1, CN, AY)

286-N. Measuring the Heat of Recrystallization of Thin Copper Wires. (In German.) Gerhard Bockstiegel and Kurt Lücke. *Zeitschrift für Metallkunde,* v. 42, Aug. 1951, p. 225-230.

Apparatus and procedure of three methods. Typical results. (N5, Cu)

287-N. A Transformation of the Mn_3Cr Phase in the Manganese-Chromium System. (In German.) Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 42, Sept. 1951, p. 277-278.

Study reveals two modifications of the Mn_3Cr phase. The transformation temperature is 975° C., and Mn_3Cr changes from the α to the β the volume is found to increase as phase. (N6, Mn, Cr)

288-N. Region of Primary Crystallization of the Q-Phase of the Al-Cu-Mg System. (In Russian.) M. S. Mirgalovskaya. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 21, 1951, p. 1027-1030.

Experimental investigation (structural and X-ray analyses) revealed the region of primary crystallization of the Q-phase and the nature of the non-variant processes in which it participates. (N12, M24, Al, Cu, Mg)

289-N. An Electrical Resistance Apparatus for Studying Transformations in Metals. Its Application to Transformations in Stainless Steel. William H. Colner and Otto Zmeskal. *American Society for Metals,* Preprint 5W, 1951, 11 pages.

The specimen, in the form of a wire, is heated and cooled in a furnace or heated by an alternating current and cooled by helium to the temperature of the furnace. Resistance of the specimen is continuously recorded. Data are reported on transformations in a precipitation-hardenable stainless steel. Effect on the austenite-ferrite transformation of solution temperature, rate of cooling, and interrupted cooling. Progress of transformation at room temperature was followed for austenites of varying stability. A mechanism is proposed to account for the optimum solution temperature. (N8, M23, SS)

290-N. Gamma Loop Studies in the Iron-Titanium, Iron-Chromium, and Iron-Titanium-Chromium Systems. William P. Roe and W. P. Fishel. *American Society for Metals,* Preprint 13W, 1951, 11 pages.

Dilation studies were carried out on a series of Fe-Ti, Fe-Cr, and Fe-Ti-Cr alloys in order to determine Ac_3 transformation temperatures. These data were then used to determine shape and outer limit of the gamma-loop curve for each of these systems. The regions studied contained not more than about 5% Ti and 12% Cr. 10 ref.
(N8, M24, Fe, Ti)

291-N. Recrystallization and Grain Growth of Nickel. Glen W. Wensch and Harold L. Walker. *American Socicty for Metals,* Preprint 16W, 1951, 13 pages.

Grain sizes produced by recrystallization and grain growth of commercial purity Ni subjected to specified amounts of cold rolling and isothermally annealed for various times were studied. End points of recrystallization were determined by optical microscopy. The progress of grain growth was measured by determining average grain size after an isothermal anneal for different periods of time. Heats of activation for both recrystallization and grain growth were found. 13 ref.
(N3, N5, Ni)

292-N. Grain Growth in High Purity Iron. George Wiener. *American Society for Metals,* Preprint 17W, 1951, 16 pages.

A study of grain-growth characteristics of high-purity Fe was made at temperatures from 600 to 875° C. after deformations of 20, 30, 40, 60, and 85%. By proper combination of cold work and heat treatment, it is possible to obtain any grain size up to a limiting value obtained at the highest temperature studied. It was found possible to relate the grain growth in iron by a simple parabolic time function. Effects of time, temperature, and plastic deformation on grain size and rate of grain growth were experimentally evaluated. (N3, Fe)

293-N. The Preparation of High Melting Point Metal Single Crystals and Bicrystals With Predetermined Crystallographic Orientation. K. V. Gow and B. Chalmers. *British Journal of Applied Physics,* v. 2, Oct. 1951, p. 300-303.

Crystals are grown horizontally in an atmosphere of argon; heating is by graphite-rod resistors. The method was applied to Cu and Ni.
(N12, Cu, Ni)

294-N. Growth of Gray Cast Iron. (In Swedish.) Morris Itzel. *Gjuteriet,* v. 41, Aug. 1951, p. 113-116.

Main reasons for growth at elevated temperatures are decomposition of cementite and pearlite into ferrite and graphite; oxidation of Si and Fe; and cracking due to expansion and contraction of the casting. The influence of ordinary alloying elements on structure and growth. Different methods of preventing growth are suggested. 13 ref. (N8, CI)

SECTION P

PHYSICAL PROPERTIES and TEST METHODS

1-P. Remarks on the Note of André J. P. Meyer Concerning the Gyromagnetic Coefficients and Electromagnetic Properties of Iron, Nickel, and Cobalt, and of Some of Their Alloys. (In French.) Samuel Jackson Barnett. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Oct. 16, 1950, p. 761-762.

Criticizes two recent notes of Meyer. Existence of a discrepancy between Meyer's and the author's data. (P16, Fe, Ni, Co, SG-p)

2-P. Coercive Field of Separate Grains and of Joined Ferromagnetic Particles. (In French.) Louis Weil. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Oct. 23, 1950, p. 829-831.

Study showed that in separate sufficiently small particles, magnetization varies with rotation of the aggregates of spins. In bulk form, the variation is caused by displacement of Bloch surfaces. The transition of such changes, one into the other, during sintering of powdered metals, was investigated for ferro-nickel. (P16, Fe-n, Ni, SG-np)

3-P. Method of Determination of Interfacial Tensions at High Temperatures. (In Russian.) S. I. Popel, O. A. Esin, and P. V. Geld. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 21, 1950, p. 1097-1100.

Apparatus by which the boundary between liquid metal and liquid slag may be examined by X-ray photography. From the curvature of the boundary, interfacial tension may be calculated. Typical data for several cast-iron—slag compositions are tabulated. 12 ref. (P10, B21, CI)

4-P. The Titanium-Hydrogen System and Titanium Hydride. I. Low-Pressure Studies. Thomas R. P. Gibb, Jr., and Henry W. Kruschwitz, Jr. *Journal of the American Chemical Society,* v. 72, Dec. 1950, p. 5365-5369.

TiH_2 was prepared and its density determined. Dissociation pressure was measured for the Ti-H system over the range 500-800° C., and 50-800 mm. X-ray diffraction patterns were observed for several compositions in the range $TiH_{0.86}$ to TiH_2. A nearly linear relation of density to composition was found from Ti to TiH_2. Ti containing small quantities of interstitial H_2 was found to react rapidly with pure H_2 at room temperature and atmospheric pressure. (P10, Ti)

5-P. Preparation, Stability and Adsorptive Properties of the Carbides of Iron. H. H. Podgurski, J. T. Kummer, T. W. DeWitt, and P. H. Emmett. *Journal of the American Chemical Society,* v. 72, Dec. 1950, p. 5382-5388.

Results of CO and H_2 adsorption studies for the various iron carbides. Preparation and properties of the iron carbides including use of hydrocarbons as carbiding agents, rate of carbiding as a function of surface area, and relative stability of Fe_3C, Hägg Fe_2C, and hexagonal Fe_2C. 16 ref. (P13, C-n, Fe)

6-P. The Anisotropy of Nitrogen Adsorption on Single Crystal Copper Surfaces. T. N. Rhodin, Jr. *Journal of the American Chemical Society,* v. 72, Dec. 1950, p. 5691-5699.

Previously the heat of adsorption on a definite face of a crystal has not been measured because large enough ideal plane surfaces were not available. Suitable single-crystal Cu surfaces which approach flatness on an atomic scale and are composed of a single species of atoms arranged in a well-ordered surface array were successfully prepared and characterized. In order to define effects of various factors for a simple gas-surface system, adsorption isotherms of N_2 at 78.1, 83.5

and 89.2° K on single-crystal and polycrystal surfaces of Cu were determined with a sensitive quartz-beam vacuum micro-balance. 37 ref. (P13, Cu)

7-P. The Heat of Formation of Thorium Tetrachloride. LeRoy Eyring and Edgar F. Westrum, Jr. *Journal of the American Chemical Society,* v. 72, Dec. 1950, p. 5555-5556.

Heats of solution of thorium metal and of $ThCl_4$ in 6 M. HCl were measured. (P12, Th)

8-P. Electrolysis of Aluminum Solutions in a Magnetic Field. Charles E. Wood and C. W. Tittle. *Journal of Chemical Physics,* v. 18, Dec. 1950, p. 1683.

Formation of a molten deposit on the Al anode of an electrolytic cell with a Pt cathode and an electrolyte of aqueous $Al_2(SO_4)_3$ in the presence of a magnetic field of 2000 gauss was reported by Antonoff and Rowley. These experiments were repeated with magnetic inductions up to 8160 gauss under a variety of conditions. In none of the experiments was the molten deposit formed. Corrosion was evident in all cases. (P16, P15, Al)

9-P. An Interferometric Study of Some Optical Properties of Evaporated Silver Films. R. C. Faust. *Philosophical Magazine,* ser. 7, v. 41, Dec. 1950, p. 1238-1254.

Thermally evaporated Ag films were studied in the reflectivity range 4-95%. Air-Ag and glass-Ag reflection and transmission coefficients, corresponding reflection phase changes, and apparent film thickness were measured and compared with those of sputtered Ag films. 14 ref. (P17, Ag)

10-P. Superconductivity of Niobium. L. C. Jackson and H. Preston-Thomas. *Philosophical Magazine,* ser. 7, v. 41, Dec. 1950, p. 1284-1289.

(P15, Cb)

11-P. A Study of the Magneto-Resistance of Silicon-Iron. R. Parker. *Proceedings of the Physical Society,* v. 63, sec. B, Dec. 1, 1950, p. 996-1004.

Fe containing a small percentage of Si in solid solution has an unusually small magneto-resistance. Longitudinal and transverse curves of $\Delta\rho/\rho$ vs. field strength were obtained for a number of single and polycrystalline specimens. It is concluded that the small magneto resistance is due to the small contribution of individual crystallites and not to an averaging-out process. 23 ref. (P16, Fe, SG-p)

12-P. Investigations on the Reversible Susceptibility of Ferromagnetics. R. S. Tebble and W. D. Corner. *Proceedings of the Physical Society,* v. 63, sec. B, Dec. 1, 1950, p. 1005-1016.

Mutual inductometer bridge method developed to measure the above by application of small alternating fields to specimens in the form of long wires. Corrections which must be applied because of finite amplitude of the alternating field and for eddy current effects were investigated with an over-all accuracy of about 1%. Typical results given for Swedish iron show a marked increase in susceptibility after decarburizing and annealing. Relation to the ideas of Néel and the statement of Gans that reversible susceptibility is a unique function of intensity of magnetization and independent of magnetic history of the specimen. 18 ref. (P16, Fe, SG-n, p)

13-P. Deoxidation; Thermodynamic Principles and Equilibria. F. D. Richardson. *Iron and Steel,* v. 23, Nov. 28, 1950, p. 430-432; disc., p. 466-470.

See abstract of "The Thermodynamic Background of Iron and Steelmaking Processes. II. Deoxidation," *Journal of the Iron and Steel Institute,* item 358-P, 1950. (P12, D general, ST)

14-P. Contribution to the Electron Emission of Metal Oxides, Alloys, and Metal Carbides. (In German.) Erich Krautz and Günter Lautz. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 2, 1950, p. 192-198.

On the basis of the formula for thermionic electron emission, a linear relation between average value of work function and temperature of optimum thermionic emission is derived. Alloys of Cr, especially with Fe and Ni, show decomposition for higher temperatures caused by evaporation and migration of Cr on the emitting surface. Thermionic emission of the metal carbides is much smaller than that of the alkaline earth oxides and is diminished by oxidizing processes during heating of the cathodes. (P15, C-n, Cr, Fe, Ni)

15-P. Electrochemical Behavior of Iron in Solutions of Oxidizing Agents. I. Electrode Potentials of Iron in Solutions of Oxidizing Agents. (In Russian.) L. Ya. Gurvich and G. V. Akimov. *Izvestia Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of USSR), Section of Chemical Sciences, Sept.-Oct. 1950, p. 457-464.

Electrode potentials were determined in 0.0001-0.1 *N* HNO_3 solutions, and in solutions of KNO_3, $K_2Cr_2O_7$, $KMnO_4$, and $(NH_4)_2S_2O_8$. Influence of ferric ions on electrode potentials of Fe. Method of investigation and data. (P15, Fe)

16-P. Solubility of the Elements of Mendeleev's Periodic System in Nickel. (In Russian.) I. I. Kornilov. *Izvestia Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of USSR), Section of Chemical Sciences, Sept.-Oct. 1950, p. 475-484.

Relationships of atomic diameters, lattice type, and location of the elements in the periodic system. Possibility of forecasting the formation of solid solutions of elements with Ni on the basis of position in the periodic table. 34 ref. (P10, N12, Ni)

17-P. Thermal Insulating Properties of Carbonized Corkboard and Layered Metal Sheets at Low Temperatures. (In English.) Tadao Fukuroi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Aug. 1949, 107-110.

Experiments were made as an aid in design of cold-storage structures of corkboard, laminated Al, or Sn sheets. Apparatus, method, and data. (P11, T10, Al, Sn)

18-P. Solidification Shrinkage of Some Aluminum Alloys. (In Japanese.) S. Torii. *Journal of the Casting Institute of Japan,* v. 22, no. 9, 1950, p. 7-13.

Linear rates of solidification shrinkage of pure Al and Al alloys were measured. An equation represents these rates and relative order of magnitude. Method for calculation of thermal coefficient of expansion from corrected melting points. (P10, Al)

19-P. Effect of Heat Treatment on the Electrical Properties of Germanium. H. C. Theuerer and J. H. Scaff. *Journal of Metals,* v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 59-63.

Ge may be reversibly converted from *n* to *p* type by heat treatment. Data for the conversion and associated changes in resistivity. Results are interpreted in terms of changes in donor-acceptor balance. (P15, Ge)

20-P. Grain Boundary Effect in Surface Tension Measurement. Harry Udin. *Journal of Metals,* v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 63.

Surface tension of solid Cu was determined by the writer and associates in 1948. It was assumed that grain-boundary energy in a pure metal was very small in comparison to energy of an external surface. Accordingly, internal surface energy of the coarse-grained specimens was neglected. Since that time, experimental evidence has accumulated showing that grain-boundary energy is generally about one-third of the energy of an external surface. Develops equation for evaluation of grain-boundary energy. (P10)

21-P. Magnetism and the Magnetic Anneal. J. P. Martin. *Steel Horizons,* v. 13, Winter 1950-51, p. 8-9, 18.

Fundamental principles of magnetism and the magnetization process. Improvements in properties of magnetic alloys produced by annealing in a magnetic field. (P16, J23, SG-n,p)

22-P. Studies of the Propagation Velocity of a Ferromagnetic Domain Boundary. H. J. Williams, W. Shockley, and C. Kittel. *Physical Review,* ser. 2, v. 80, Dec. 15, 1950, p. 1090-1094.

Experimental results on propagation velocity in a crystal of silicon iron with a simple domain structure. 14 ref. (P16, Fe)

23-P. On the Mechanism of Impurity Band Conduction in Semiconductors. Cavid Erginsoy. *Physical Review,* ser. 2, v. 80, Dec. 15, 1950, p. 1104-1105.

Hung and Gliessman have reported on the anomalous low-temperature behavior of the resistivity and the Hall coefficient of Ge. Similar anomalies have been observed in SiC by Busch and Labhart. Reports work on SiC, and attempts to interpret results of the last authors on the basis of a conduction mechanism in an impurity band formed by interaction of excited impurity states at high concentrations. It is believed that the proposed model can explain deviations of Ge from Hung's calculated values. (P15, Ge)

24-P. Hall Coefficient and Resistivity of Evaporated Bismuth Layers. W. F. Leverton and A. J. Dekker. *Physical Review,* ser. 2, v. 81, Jan. 1, 1951, p. 156-157.

Results of measurement and their theoretical interpretation. (P15, Bi)

25-P. Ferromagnetism: Magnetization Curves. Edmund C. Stoner. *Reports on Progress in Physics,* v. 13, 1950, p. 83-183.

Reviews work since 1934 on the variation with field of the magnetization of ferromagnetics and associated phenomena. 227 ref. (P17, SG-n, p)

26-P. The Spectral Emittance of Nickel and Oxide-Coated Nickel Cathodes. S. L. Martin and G. F. Weston. *British Journal of Applied Physics,* v. 1, Dec. 1950, p. 318-324.

Spectral-emittance values at 0.66μ were measured for various types of

oxide-coated cathodes and for nickel cores, using a cylindrical diffuse reflectometer. The influence of various factors, essentially affecting surface condition, on emittance, was examined. Tables show, for nickel, the effect of stoving treatment, temperature, and getter flash; and, for oxide-coated cathodes, the effect of oxide-surface texture, and subsidiary effects of glass-tube baking temperature, and getter flash. 21 ref. (P17, Ni)

27-P. Magnetic Behavior of Solid Solutions of Copper With Cobalt and FeNi Alloy. (In French.) André J. P. Meyer and Pierre Taglang. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Nov. 6, 1950, p. 956-958.

Absolute magnetic momenta and Curie points of above ferro-magnetic solid solutions were determined using special apparatus. Anomalous behavior of the Cu-Co solid solution was observed. Data and method of investigation.
(P15, Cu, Fe, Ni)

28-P. Simultaneous Determination of Optical Constants and Thickness of Very Thin Metallic Films. (In French.) Florin Abeles. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Nov. 6, 1950, p. 958-960.

Calculation method for determining thickness from factors of reflection and transmission of light. (P17, S14)

29-P. Remarks Concerning the Eötvos Law and the Surface Tension of Solid and Liquid Metals. (In French.) J. Friedel and C. Crussard. *Journal de Chimie et de Physico-Chimie Biologique,* v. 47, Sept.-Oct. 1950, p. 733-739.

Attempts were made to apply the law governing the surface tension of nonmetallic liquids to liquid metal (experimentally) and solid metal (theoretically). By comparing surface-tension values to those for energy of cohesion, a constant ratio was found to exist. 18 ref. (P10)

30-P. The Rehbinder Effect. E. N. da C. Andrade, R. F. Y. Randall, and M. J. Makin. *Proceedings of the Physical Society,* v. 63, sec. B, Dec. 1, 1950, p. 990-995.

According to Rehbinder, the immersion of wires of certain metals in a non-polar paraffin containing a little oleic acid increases the rate of flow of the metal under a given stress and its electrical resistivity. Experiments show that the mechanical effect can be obtained with single crystals of Cd if the surface is contaminated by a thin oxide layer, which is known to increase the critical shear stress, but not if the surface is clean. The effect is accordingly attributed to disruption of the hardening surface layer by the active agent and not to penetration into the metal, as assumed by Rehbinder. It was not possible to detect any electrical effects with Cd or Pb crystal wires having either clean or contaminated surfaces.
(P15, Q2, Cd, Pb)

31-P. Physical Properties of Some Liquid Metals. R. R. Miller, compiler. *Metal Progress,* v. 59, Jan. 1951, p. 80B. (From "Liquid Metals Handbook", Office of Naval Research Publication NAVEXOS P-733.)

A table. Covers Al, Sb, Bi, Cd, Cs, Ga, In, Pb, Li, Mg, Hg, K, Rb, Na, Tl, Sn, Zn, two Na-K alloys, and the eutectic Pb-Bi alloy.
(P general, EG-a)

32-P. A New Method for the Measurement of Hall Coefficients. B. R. Russell and C. Wahlig. *Review of Scientific Instruments,* v. 21, Dec. 1950, p. 1028-1029.

Circuit diagrams for apparatus for rapid measurement of Hall coefficients and for continuous recording of Hall voltages. (P15, SG-n, p)

33-P. Electrical Resistance of Platinum at High Temperatures. H. E. Bennett. *Review of Scientific Instruments,* v. 21, Dec. 1950, p. 1029.

Schneider and Hollies reported (v. 21, 1950, p. 94) that resistance of a coil of Pt wire, of "commercial" or "thermocouple" purity, wound on a grooved alundum rod and supported in the center of a furnace, reached a maximum at about 1575° C. and progressively decreased as the temperature was further increased up to about 1650° C. The present author checked this observation and found no such inflection in the resistance-temperature curve. Suggests that Schneider and Hollies' results were due to changes in electrical resistivity of the alundum rod. (P15, S16, Pt)

34-P. Superconductivity of Tin Isotopes. I. W. D. Allen, R. H. Dawton, J. M. Lock, A. B. Pippard, and D. Shoenberg. **II.** W. D. Allen, R. H. Dawton, Marianne Bar, K. Mendelssohn, and J. L. Olsen. *Nature,* v. 166, Dec. 23, 1950, p. 1071-1072.

Results of measurements of superconducting transition temperatures and critical fields of nearly pure tin isotopes separated by the electromagnetic method. Results of measurements on the same isotopes by two different methods, in addition to some experiments on magnetic susceptibility. Detailed measurements of dependence of electrical

resistance on temperature and magnetic field were made. (P15, Sn)

35-P. Hall Effect in a Selenium Single Crystal. K. W. Plessner. *Nature,* v. 166, Dec. 23, 1950, p. 1073.

Results of measurement are charted and discussed. (P15, Se)

36-P. The Evaporation of Titanium. L. G. Carpenter and W. N. Mair. *Proceedings of the Physical Society,* v. 64, sec. B, Jan. 1, 1951, p. 57-66.

Data on the evaporation rate of β-Ti over the range 1650-1810° K. and an equation which represents the data. Latent heat of vaporization is deduced both from measured values of evaporation rate, together with known thermodynamic functions of the solid and gas, and also from temperature coefficient of evaporation rate. Variation of total radiation with temperature, and of vapor pressure at the melting point is estimated. 13 ref. (P12, Ti)

37-P. Ferromagnetic Materials and Ferrites; Properties and Applications. M. J. O. Strutt. *Wireless Engineer,* v. 27, Dec. 1950, p. 277-284.

Losses in ferromagnetic materials; optimum conditions for cored inductances; physics of ferromagnetism, composition of useful ferrites, and applications of ferrites. (P16, SG-n, p)

38-P. Surface Energy and Structure of Crystal Boundaries in Metals. K. T. Aust and B. Chalmers. *Proceedings of the Royal Society,* ser. A, v. 204, Dec. 22, 1950, p. 359-366.

Variation of boundary energy γ_R in Pb with difference of orientation θ was determined using methods previously described for Sn. Straight-line plots of log θ against γ_R/θ were obtained for Pb and Sn. These results are closely consistent with Shockley and Read's theoretical predictions based on a dislocation model of the transition boundary. (P10, M26, Pb, Sn)

39-P. Calculation of the Curie Points of Ferromagnetic and Paramagnetic Substances Based on the Concept of Intermittent Activation. (In French.) Robert Forrer. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Nov. 20, 1950, p. 1130-1131.

Basis of a theory concerning the existence of intermittent activation, and a method for determination of Curie points based on intermittent-activation values. (P16)

40-P. Progress of the Physics of Solids. Frederick Seitz. *Journal of the Franklin Institute,* v. 251, Jan. 1951, p. 156-166.

Emphasis on development of the theory of nearly perfect crystals. (P general, M26, U1)

41-P. Segregation in Regular Ternary Solutions. Part I. J. L. Meijering. *Philips Research Reports,* v. 5, Oct. 1950, p. 333-356.

Segregation in ternary phases is examined from a thermodynamic point of view. 10 ref. (P12, M24)

42-P. Oxide Cathode Base Metal Studies. Ralph Forman and Glenn F. Rouse. *Journal of Research of the National Bureau of Standards,* v. 46, Jan. 1951, p. 30-37.

A method for comparing the properties of two oxide catnodes, one with a high-purity Ni base and the other with a Ni base containing a small percentage of Mg. Data showing effect of Mg on the rate of electrolytic activation and life of the cathode. Influence of cathode and anode on pulsed current decay at high current densities. 15 ref. (P15, T1, Ni)

43-P. Thermoelectromotive Force of a Superconductor Versus the Same Metal in the Non-Superconductive State. M. C. Steele. *Physical Review,* ser. 2, v. 81, Jan. 15, 1951, p. 262-267.

Measurements of thermo-electromotive force of superconducting vs. normal junctions were made for Pb, Sn, In, and Tl. The technique used differed in several respects from that employed by previous workers. Results are discussed in light of existing theory. The data obtained are in good agreement with a relation derived from Fermi-Dirac statistics and the assumption that the Thomson coefficient of a superconductor is zero. 14 ref. (P16, Pb, Sn, In, Tl)

44-P. Vanadium-Oxygen Equilibrium in Liquid Iron. John Chipman and Minu N. Dastur. *Journal of Metals,* v. 191, Feb. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 111-115.

Equilibrium data on the reaction of H_2O vapor with V dissolved in liquid Fe at 1600° C. Thermodynamic behavior of V and O_2 when present together in the melt. A deoxidation diagram shows concentrations and activities of V and O_2 in equilibrium with V_2O_3, or FeV_2O_4. 18 ref. (P12, Fe, V)

45-P. Vapor Pressure of Inorganic Substances. IV. Tantalum Between 2624 and 2943° K. James W. Edwards, Herrick L. Johnston, and Paul E. Blackburn. **V. Zirconium Between 1949 and 2054° K.** Gordon B. Skinner, James W. Edwards, and Herrick L. Johnston. *Journal of the American*

Chemical Society, v. 73, Jan. 1951, p. 172-176.

Experimental data are tabulated and charted. 17 ref. (P12, Ta, Zr)

46-P. A Thermodynamic Study of Liquid Metallic Solutions. III. The Systems Bismuth-Gold and Thallium-Gold. O. J. Kleppa. *Journal of the American Chemical Society,* v. 73, Jan. 1951, p. 385-390.

Investigated by the electromotive-force method. Both systems show large entropies of mixing believed to originate in the large differences in atomic size between the two components. (P12, Bi, Au, Tl)

47-P. The Effects of Plastic Deformation on Magnetic Properties of Polycrystalline Metals. Ursula M. Martius. *Canadian Journal of Physics,* v. 29, Jan. 1951, p. 21-31.

The concept of a "closed flux shell" as a fundamental quality of polycrystalline metal. Consequences of this model and experimental evidence supporting it. An explanation of the effect of plastic deformation on magnetic properties is suggested by considering changes in the size of the closed flux shell which will occur during plastic deformation. (P16, Q24, SG-n,p)

48-P. A Method of Measuring Gamma-Ray Absorption Coefficients at 0.51 Mev. P. E. Argyle, G. M. Griffiths, and J. B. Warren. *Canadian Journal of Physics,* v. 29, Jan. 1951, p. 83-85.

The coincidence method makes use of the angular correlation between pairs of annihilation quanta to eliminate the effect of scattered radiation usually present in absorption measurements. Mass absorption coefficients were determined for Pb, Cu, and Al. (P10, Pb, Cu, Al)

49-P. Discussion on the Paper: "Change of Electrical Resistance During Strain-Ageing of Iron", by A. H. Cottrell and A. T. Churchman. *Journal of the Iron and Steel Institute,* v. 166, Dec. 1950, p. 322-324.

Covers above paper published in July 1949 issue (see item 3B-229, 1949). Includes author's reply. (P15, N7, Fe)

50-P. Thermal Dilation of Copper. (In English.) D. S. Eppelsheimer and R. R. Penman. *Physica,* v. 16, Oct. 1950, p. 792-794.

The prediction that certain cubic metals may not be precisely cubic at temperatures below their melting points led to the present investigation. Pure Cu was examined for anisotropy in its thermal dilation. Temperatures of examination ranged between 18 and 770° C. Plotting lattice constant vs. temperature, the thermal dilation of pure Cu was found to be isotropic throughout the range investigated. (P11, Cu)

51-P. Measuring Pressure by Means of Metallic Probes. (In German.) E. Fischer. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, Jan. 11, 1951, p. 37-40.

How probes can be used to measure long-time, short-time, or impact pressures up to 10,000 and more atmospheres. Metals with certain properties (which are enumerated) are unsatisfactory for this purpose. Graphs show pressure vs. expansion curves of various metals such as Pb, Cu, Al, and Ni alloys, etc. (P11, Pb, Cu, Al, Ni)

52-P. Permanent Magnets. (In French.) C. Vuilleumier. *Von Roll Mitteilungen,* v. 9, Dec. 1950, p. 65-96.

Part I reviews the fundamental principles of magnetism. Parts II and III: rules for magnet design and calculations, showing how to substitute the new highly magnetic alloys for the older types. Part IV: the metallurgy of permanent-magnet alloys, including effect of crystal structure on magnetic properties. Final part: manufacture of permanent magnets in a Swiss plant. 11 ref. (P16, SG-p)

53-P. Investigation of Magnetic Properties of Alloys of Manganese With Nickel and Cobalt. (In Russian.) F. Galperin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Dec. 1, 1950, p. 515-518.

Influence of concentration of the components on the magnetic properties of these alloys. Method of preparation of test samples. (P16, Mn, Ni, Co)

54-P. Energy of Mixing of Binary Metallic Systems. (In Russian.) Ya. E. Geguzin and B. Ya. Pines. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Dec. 1, 1950, p. 535-538.

Determination of energies on the basis of measurements of heat of fusion and heat capacity of five binary systems: Pb-Sn, Bi-Cd, Bi-Sb, Bi-Sn, and Pb-Bi. Technique of measurement. A formula for calculation of the values is proposed and theoretically analyzed. 10 ref. (P12, Pb, Sn, Bi, Cd, Sb)

56-P. Hall Effect in Indium. (In Russian.) E. S. Borovik. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Dec. 11, 1950, p. 639-641.

Dependence of resistance on temperature and magnetic field strength, and of Hall constant on the latter, at 2.17, 4.22, 14.2, and 78° K. Ex-

perimental data closely correspond to those theoretically computed by Sondheimer, Wilson, and Kohler. (P15, In)

57-P. Concerning the Goldhammer Effect in Ferromagnetic Substances. (In Russian.) S. V. Vonsovskii and K. P. Rodionov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Dec. 11, 1950, p. 643-646.

Theory of the Goldhammer effect discovered in 1889 and clarified on the basis of thermodynamic theory by Akulov in 1939. Attempts to clarify the nature of the forces responsible for this effect. 10 ref. (P16, SG-n,p)

58-P. Investigation of Magnetic Properties of Alloys With Ordered Structure. (In Russian.) F. Galperin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Dec. 11, 1950, p. 647-650.

Five ferromagnetic alloys having an ordered structure were investigated. They were Ni_3Mn, Ni_3Fe, FeCo, MnBi, and CrTe. A specially developed method of investigation, including a new calculation formula. 11 ref. (P16, SG-n,p)

59-P. Certain Laws of Magnetic Viscosity. (In Russian.) R. V. Telesin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Dec. 11, 1950, p. 659-660.

On the basis of theoretical considerations corroborated by experimental data, the following laws governing magnetic viscosity are proposed: time of relaxation characterizing magnetic viscosity is directly proportional to differential susceptibility and inversely proportional to absolute temperature; magnetic viscosity does not depend on changes in magnetic field, but only on final state of the ferromagnetic. (P16, SG-n,p)

60-P. Influence of Silicon on Thermodynamic Behavior of Carbon Dissolved in Solid and Molten Iron. (In Russian.) A. M. Samarin and L. A. Shvartsman. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Nov. 1950, p. 1696-1700.

Experimental investigation showed that the influence of Si on the activity of C dissolved in γ-iron may be approximately described on the basis of the assumption that both a C atom and a Si atom cannot be found simultaneously in an elementary nucleus. In liquid iron-carbosilicon alloys, saturated with C at 1300° C., the total amount of C and Si is practically constant and approximates 0.2 atomic %. (P12, ST)

61-P. The Release of Energy Associated With Crystal Restoration Process in Cold Worked Polycrystalline Copper. (In English.) Taira Suzuki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Oct. 1949, p. 193-201.

Experimental results. (P10, N5, Cu)

62-P. Reduction Equilibria of Iron Oxides. I. Measurement of the Equilibrium of Reaction, Fe_3O_4 (in Wuestit) $+CO=3FeO$ (in Wuestit) $+CO_2$. (In English.) Koji Sanbongi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Oct. 1949, p. 213-222.

Experimental method, apparatus and results. (P12, Fe)

63-P. The Change of the Electric Resistance of Bismuth Crystals in Strong Magnetic Fields. Part I. The Method and Apparatus for Observing the Change of Resistance of Bismuth in Strong Magnetic Fields. Part II. Experimental Results. The Change of Resistance of Bismuth Crystals in a Magnetic Field With the Current Perpendicular to the Field. (In English.) Tasaku Tanabe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Oct. 1949, p. 267-282.

18 references. (P15, Bi)

64-P. On the Magnetostriction of Iron-Aluminium Alloys and a New Alloy "Alfer". (In English.) Kotaro Honda, Hakaru Masumoto, Yuki Shirakawa, and Takeo Kobayashi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Dec. 1949, p. 341-347.

Magnetostriction of Fe-Al alloys was measured by an apparatus designed by the authors in various longitudinal fields of less than 1200 oersteds. The positive magnetostriction of iron gradually increases on addition of Al, while the negative one decreases. In the range of Al content 11.5-13.2%, magnetostriction is very high. These alloys are designated "Alfers." (P16, SG-n,p, Fe)

65-P. Electric Resistance, Hall Effect, Magneto-Resistance and Seebeck Effect on a Pure Tellurium Film. (In English.) Tadao Fukuroi, Seiichi Tanuma, and Shotaro Tobisawa. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Dec. 1949, p. 365-372.

Investigated from −195 to +60° C. Electrical resistance and weight of the deposits were compared for various thicknesses of the films and a

correlation found between them. Apparatus and data. (P15, P16, Te)

66-P. On the Electro-Magnetic Properties of Single Crystals of Tellurium. I. Electric Resistance, Hall Effect, Magneto-Resistance, and Thermo-Electric Power. (In English.) Tadao Fukuroi, Seiichi Tanuma, and Shotaro Tobisawa. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Dec. 1949, p. 373-386.

Investigated from −190 to +300° C. The crystals were found to be P-type extrinsic semiconductors at low temperatures, while intrinsic conduction supersedes it above the ice point. In terms of the electrical and electromagnetic data, concentrations, mobilities, effective masses, and mean free paths of positive holes and electrons are expressed as functions of temperature. 21 ref. (P15, P16, Te)

67-P. The Physics of Sheet Steel. (Series continued). G. C. Richer. *Sheet Metal Industries,* v. 28, Jan. 1951, p. 19-22.

Development and use of the basic equations of technical magnetization. (To be continued.) (P16, ST)

68-P. Magnetic Properties of Malleable Cast Iron. (In French.) Francois Danis. *Fonderie,* Nov. 1950, p. 2267.

Variation of magnetic properties with C, Si, and Mn content. (P16, C1)

69-P. (Pamphlet) **Pipe and Tubes for Elevated Temperature Service.** Bulletin 26, 1950, 64 pages. National Tube Co., Pittsburgh.

Data on the properties of steels employed for elevated temperatures and high pressures. Covers 26 different analyses representing a wide variety of chemical compositions. (P general, Q general, ST, SG-h)

70-P. Secondary Emission of Nickel-Barium Mixtures and Rhenium When Bombarded by Electrons With Energies From 50 to 8000 Electron-Volts. H. E. Farnsworth and M. J. Lun. *Journal of Applied Physics,* v. 22, Jan. 1951, p. 77-79.

Results of work on an alloy of Ni + 1.5% Ba and on rhenium. (P15, Ni, Re)

71-P. A Note on the Metallic Behavior of $MoSi_2$. Frank W. Glaser. *Journal of Applied Physics,* v. 22, Jan. 1951, p. 103.

Electrical resistivity and temperature coefficient of resistivity were measured for $MoSi_2$ prepared by cold pressing and sintering. Results indicate that noninterstitial compounds between transition metals and nonmetals may also have metallic properties, as is the case with interstitial compounds. (P15, Mo, Si)

72-P. Plasticity and Conductivity; Analogous Flow Phenomena in Copper Alloys. Rolland Sydney French. *Journal of Applied Physics,* v. 22, Jan. 1951, p. 105-106.

Analyzes and correlates experimental data. Relationships between plastic deformation and electrical conductivity are shown graphically. (P15, Q23, Cu)

73-P. The Entropies of Melting of Metals. R. A. Oriani. *Journal of Chemical Physics,* v. 19, Jan. 1951, p. 93-97.

The melting process is conceived as consisting of an expansion, followed by a disordering of the crystal structure. The entropy contribution from the first effect is calculated by analogy with the process occurring in volume expansion within an individual phase; the entropy contribution from the melting disorder is then obtained by difference from the measured entropy of fusion. Tentative conclusions are drawn from the relative magnitudes of the various quantities. A simple model for the melting process is adopted, making possible a correlation between amount of disordering during melting and structural contribution to entropy of melting. (P12)

74-P. The Thermodynamic Properties of Gaseous Titanium. Paul W. Gilles and Quentin de L. Wheatley. *Journal of Chemical Physics,* v. 19, Jan. 1951, p. 129-130.

Results of calculations for the ideal monatomic gas in the range 0 to 5000° K. 11 ref. (P12, Ti)

75-P. Liquid Metal Heat-Transfer Coefficients. Richard N. Lyon. *Chemical Engineering Progress* (Transactions Section), v. 47, Feb. 1951, p. 75-79.

A simple means of calculating heat transfer in liquid metals. Small-scale handling methods have also been developed. If these methods can be scaled up to industrial size, the potentialities of liquid metals as heat-transfer media can be fully realized. 15 ref. (P11)

76-P. Measurements of Gamma-Ray Absorption Coefficients. Charlotte Meaker Davisson and Robley D. Evans. *Physical Review,* v. 81, Feb. 1, 1951, p. 404-411.

Absorption of γ-rays in Al, Cu, Sn, Ta, and Pb was measured. Tests showed that scattering from nearby objects and from the absorber were negligible. Tests of the absorption of radium γ-rays in Pb showed good agreement with other workers and with theory. 23 ref. (P10, Al, Cu, Sn, Ta, Pb)

77-P. Interaction Between the *d* Shells in the Transition Metals. C.

Zener. *Physical Review,* v. 81, Feb. 1, 1951, p. 440-444.

Review of the crystal structure and of the magnetism of the transition elements has led to very simple principles which appear to govern the interaction between the incomplete *d* shells of neighboring atoms. The body-centered cubic structure of the transition metals V, Cr, Cb, Mo, Ta, and W is thereby interpreted, as well as more complex lattices of certain alloys. 12 ref.
(P16, M26, V, Cr, Cb, Mo, Ta, W)

78-P. Low Temperature Resistance Minimum in Magnesium Measured by a Mutual Inductance Method. H. E. Rorschach and Melvin A. Herlin. *Physical Review,* ser. 2, v. 81, Feb. 1, 1951, p. 467.

A method which may prove to be useful for many types of low-temperature resistance measurements.
(P15, Mg)

79-P. Ferromagnetic Resonance in Various Ferrites. W. A. Yager, F. R. Merritt, and Charles Guillaud. *Physical Review,* ser. 2, v. 81, Feb. 1, 1951, p. 477-478.

Results of ferromagnetic-resonance experiments at room temperature and at a frequency of 24, 164 mc. per sec. on spherical polycrystalline specimens of Mg, Ni, Co, Mn, and Mn-Zn ferrites.
(P16, Mg, Ni, Co, Mn, Zn, SG-n,p)

80-P. Pure Metals. *Metal Progress,* v. 59, Feb. 1951, p. 280, 282. (Condensed from "Metallurgy Behind the Decimal Point", Earle E. Schumacker.)

Previously abstracted from *Journal of Metals.* See item 272-P, 1950.
(P15, P16, Q23, Pb, Si, Ge, SG-n, p)

81-P. The Vapor Pressure of Gold and the Activities of Gold in Gold-Copper Solid Solutions. Lewis D. Hall. *Journal of the American Chemical Society,* v. 73, Feb. 1951, p. 757-760.

Experimental procedures and apparatus. Radioactive gold was used as a tracer. The technique is also applicable to vapor-pressure measurement of other metals. 15 ref.
(P12, Au, Cu)

82-P. The Mutual Solubility of Mercury and Gallium. William M. Spicer and Henry W. Bartholomay. *Journal of the American Chemical Society,* v. 73, Feb. 1951, p. 868-869.

Results of experiments are tabulated and discussed. (P13, Ga, Hg)

83-P. Melting and Crystal Structure. A. R. Ubbelohde. *Quarterly Reviews,* v. 4, No. 4, 1950, p. 356-381.

Theoretical and experimental studies on changes in thermodynamic and other properties of metals and nonmetals near their melting points. 71 ref. (P12)

84-P. An Oscillation Type Magnetometer. J. H. E. Griffiths and J. R. MacDonald. *Journal of Scientific Instruments,* v. 28, Feb. 1951, p. 56-58.

A simple method of measuring saturation magnetization of thin plane samples of ferromagnetic materials. The sample performs oscillations in a uniform magnetic field about an axis in the plane of the sample and at right angles to the magnetic field. The method was tested by measurements on sheet Ni and Supermalloy 0.11 mm. thick and has been used with films of Ni down to 0.1 mm. thick.
(P16, Ni, SG-n, p)

85-P. The Properties of Evaporated Gold and Tungsten Oxides. P. G. Wilkinson. *Journal of Applied Physics,* v. 22, Feb. 1951, p. 226-232.

Gold blacks, prepared by evaporating gold from a tungsten filament, were found to contain tungsten oxides which greatly affected optical and electrical properties. Exposure to air or oxygen caused an increase in electrical resistance and optical transmission of films of WO_2 and WO_3 evaporated in high vacuum. It was concluded that evaporated films of pure gold are unaffected by exposure to air and that changes in optical and electrical characteristics of evaporated gold films exposed to air are caused by contamination with tungsten oxides. 17 ref.
(P15, P17, Au, W)

86-P. A Dynamic Method for Measuring the Specific Heat of Metals. Alan M. Nathan. *Journal of Applied Physics,* v. 22, Feb. 1951, p. 234-235.

Method applicable under conditions of rapidly increasing temperature (1000° C. per sec.) together with some results obtained with it. The method was used for a preliminary study of the specific-heat curves of low-carbon steel at the phase-transformation points. Includes circuit diagram and tabular data. (P12)

87-P. Growth of Germanium Single Crystals Containing p-n Junctions. G. K. Teal, M. Sparks, and E. Buehler. *Physical Review,* ser. 2, v. 81, Feb. 15, 1951, p. 637.

Technique of production and properties. The crystals have unusual rectifying characteristics.
(P15, N12, Ge)

88-P. Theory and Experiment for a Germanium *p-n* Junction. F. S. Goucher, G. L. Pearson, M. Sparks, G. K. Teal, and W. Shockley. *Physical Review,* ser. 2, v. 81, Feb. 15, 1951, p. 637-638.

Characteristics of the *p-n* junction. Technique of production and properties, and unusual rectifying characteristics. (P15, N12, Ge)

89-P. Theory of Alloys. O. Kubaschewski, E. Gebhardt, R. Vogel, Th. Heumann, and A. Schrader. "The American FIAT Review of German Science. Vol. 31. General Metallurgy," 1950, p. 64-136.

A review covering the thermochemistry of metals and alloys and the structure of binary, ternary, and quaternary alloys. 178 ref. (P12, M24)

90-P. A Theory of Basicity and Oxidation Applicable to Steelmaking. W. L. Kerlie. *Journal of the Iron and Steel Institute,* v. 167, Jan. 1951, p. 9-26.

Influence of slag basicity on distribution of FeO between slag and metal. A theory of oxidation and basicity is developed by which the equilibrium oxygen content of the liquid iron can be calculated with reasonable accuracy. Equilibrium constants for P and Mn reactions were evaluated and compared with constants based on analytical oxygen contents. Experiments in a basic bessemer converter showed that O_2 content of the steel is an important factor influencing final N_2 content. Examination of openhearth data shows the possibility of an improvement in technique. 29 ref. (P12, D general, ST)

91-P. Concerning Progressive Intermittent Activation in Certain Series of Ferromagnetic Alloys (In French.) Robert Forrer. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Dec. 18, 1950, p. 1444-1446.

Rhode's hypothesis of intermittent activation is theoretically analyzed and experimentally verified for Fe-Ni (γ-phase), Pt-Co, Pt-Cr, and Pt-Mn alloys. Shows that Ni and Co promote intermittent activation in γ-Fe and Pt, which themselves are not ferromagnetic. (P16, SG-n, p, Fe, Ni, Co, Cr, Mn)

92-P. Dilatometric Study of Metallic Neodymium. (In French.) Félix Trombe and Marc Foex. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Jan. 3, 1951, p. 63-65.

Investigated on quite pure material, in the range —195 to 650° C. (P11, Nd)

93-P. Tables of Constants. (In French.) Marc Foex and Alain Berton. "Les hautes Temperatures et leurs Utilisations en Chimie, Vol. II" (Masson et Cie., Paris), 1950, p. 1259-1302.

Atomic weights of the elements; melting points of the elements; melting points of simple binary inorganic compounds and oxides; normal boiling points of elements and simple binary compounds and oxides; vapor pressures of the elements as a function of temperature; thermal conductivity of some elements and alloys; and thermal conductivity of refractory materials. (Values obtained by various investigators are shown, with source, in most cases.) 549 ref. (P10, P11, P12)

94-P. The Characteristic Frequencies of Cylindrical Steel Bars. (In German.) R. Adolph, H. O. Kneser, and I. Schulz. *Annalen der Physik,* ser. 6, v. 8, Nov. 10, 1950, p. 99-104.

Torsion, expansion, and bending frequencies were accurately measured up to frequencies at which the wave length nearly equals the diameter of the bar. Bending frequencies are compared with those calculated according to Goens' method. Experimental apparatus and data. (P10, ST)

95-P. Temperature Dependence of Magnetic Viscosity. (In Russian.) R. V. Telesnin and E. F. Kuritsyna. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), new ser., v. 75, Dec. 21, 1950, p. 797-798.

Investigated for the range 86-615° K., that is, up to about the Curie point. Method of investigation. The Ni used was 99.99% pure and had been annealed in hydrogen at 900° C. for 3 hr. (P16, Ni)

96-P. Some Remarks on the Equation of Thermionic Emission. (In English.) Yasushi Watanabe. *Technology Reports of the Tohoku University,* v. 14, No. 1, 1949, p. 1-9.

The equation of thermionic emission of a pure metal surface is expressed in two forms. Richardson's and Dushmann and Nordheim's equations. These equations have been usually regarded as independent of each other. Shows that the two equations are equivalent. (P15)

97-P. On the Equilibrium Between Iron, Sulphur and Hydrogen at High Temperature. (In English.) Sachio Matoba and Tatsuji Unotoro. *Technology Reports of the Tohoku University,* v. 14, No. 1, 1949, p. 60-76.

Presents details of experimental investigation. Part I covers reduction of FeS by H_2 and Part II the same reaction, except that the FeS is dissolved in molten Fe, as in steelmaking. 10 ref. (P12, D general, Fe, ST)

98-P. Apparatus and Technique for Measuring Thermal Conductivity of Powdered Material. W. Z. Girton and J. H. Potter. *ASTM Bulletin,* Feb. 1951, p. 47-52.

Dry, powdered material is placed in the annular space between two concentric cylinders. Quantity of heat was measured by the temperature rise of the cooling water sur-

rounding the outer cylinder. The powder was compacted in the test annulus by impressing a vibration of known amplitude and frequency upon the test cell for a specified time. Tests were made with samples of powdered zinc, carbonyl iron, copper-copper oxide eutectic, and calcium carbonate. (P11)

99-P. Electrical Resistivity of Coatings. Walter F. Rogers. *Petroleum Engineer,* v. 23, Mar. 1951, p. D5-D12, D14, D16.

A study of seven methods of measurement of electrical resistivity on pipelines to determine which coating is the most practicable.
(P15, L general, CN)

100-P. The Sorption of Gases on Metals at Room Temperature. A. L. McClellan and Norman Hackerman. *Journal of Physical & Colloid Chemistry,* v. 55, Mar. 1951, p. 374-382.

Results of investigation of sorption of O_2, Cl_2, NO, and NO_2 on chromium, 18-8 stainless steel, and ordinary steel at about 30° C.
(P13, Cr, SS, CN)

101-P. Sulphur Activities in Liquid Copper Sulphides. R. Schuhmann, Jr., and O. W. Moles. *Journal of Metals,* v. 3, Mar. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 235-241.

An equilibrium study was made of the reaction: Cu_2S (liquid) + H_2 (gas) → Cu (dissolved) + H_2S (gas) at temperatures of 1150, 1250, and 1350° C.: for liquid Cu sulfides ranging in composition from saturation with Cu to about 21.5% S. From the experimental data, activities of Cu, S, and Cu_2S in the melts were calculated, as well as location of the curve showing the compositions of Cu-saturated sulfide melts in the Cu-S constitution diagram. 10 ref.
(P12, C21, Cu)

102-P. Solubility of Hydrogen in Molten Lead. W. R. Opie and N. J. Grant. *Journal of Metals,* v. 3, Mar. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 244-245.

Results of determination are graphed and expressed in the form of an empirical equation. (P13, Pb)

103-P. High-Temperature Properties and Characteristics of a Ferritic Steam-Piping Steel. A. W. Rankin and W. A. Reich. *American Society of Mechanical Engineers,* Paper 50-A-76, 1950, 12 pages.

Mechanical and physical properties and manufacturing and heat treating characteristics of a Cr-Mo-V steel for turbine shells, valve casings, and steam leads at 900, 1000, and 1100° F.
(P general, Q general, AY, SG-h)

104-P. (Book) **Liquid-Metals Handbook; A Guide to the Use of Liquid Metals as Heat-Transfer Media.** Richard N. Lyon, editor-in-chief. 188 pages. 1950. U. S. Atomic Energy Commission and U. S. Navy Dept., Washington, D. C.

Industrial utilization, physical and chemical properties, laboratory techniques, and availability of liquid metals. Resistance of materials to attack by liquid metals, liquid-metal heat transfer, and large-scale handling of some liquid metals. Covers metals and alloys melting below 660° C. (P general, R6, SG-d).

105-P. Fluid Flow Through Porous Metals. Leon Green, Jr., and Pol Duwez. *Journal of Applied Mechanics,* v. 18 (*Transactions of the American Society of Mechanical Engineers,* v. 73), Mar. 1951, p. 39-45.

Method for correlating experimental data obtained in studies of the above. The correlation is based upon the suggestion of Forcheimer that the pressure gradient attending flow of a liquid through a porous medium can be expressed as a function of flow rate by a simple quadratic equation. Results of experiments on variety of porous metals. 11 ref.
(P10)

106-P. Low Temperature Heat Capacities of Inorganic Solids. V. The Heat Capacity of Pure Elementary Boron in Both Amorphous and Crystalline Conditions Between 13 and 305° K. Some Free Energies of Formation. Herrick L. Johnston, Herbert N. Hersh, and Eugene C. Kerr. *Journal of the American Chemical Society,* v. 73, Mar. 1951, p. 1112-1117.

28 references. (P12, B)

107-P. Viscosity of the Sodium-Potassium System. Curtis T. Ewing, Joseph A. Grand, and R. R. Miller. *Journal of the American Chemical Society,* v. 73, Mar. 1951, p. 1168-1171.

A closed viscometer technique was developed and applied to reactive metals with unusually high surface-tension ranges. Viscosities were measured for Na, K, and several alloys from 60 to 200° C. The values for the alloys were observed to vary uniformly between those for the metals, and an equation was applied to satisfy the data. (P10, Na, K)

108-P. Specific Heat of Beryllium Between 0° and 900°. D. C. Ginnings, T. B. Douglas, and Anne F. Ball. *Journal of the American Chemical Society,* v. 73, Mar. 1951, p. 1236-1240.

Using an ice calorimeter and furnace of improved design, the specific heat of two samples of Be was determined by measuring changes of enthalpy between above limits. Sources of error in the values obtained are examined. 15 ref. (P12, Be)

109-P Phase Boundary Potentials of Nickel in Foreign Ion Solutions. D. MacGillavry, J. J. Singer, Jr., and J. H. Rosenbaum. *Journal of the American Chemical Society,* v. 73, Mar. 1951, p. 1388.

Investigation of phase-boundary potentials of inert metals in contact with solutions initially free from the common metal ions was believed to be of value in understanding the initial processes which induce corrosion of metal. A preliminary account of measurements on Ni. (P13, R1, Ni)

110-P. H. F. Magnetization of Ferromagnetic Laminae; Application of Classical Theory. O. I. Butler and H. R. Chablani. *Wireless Engineer,* v. 28, Mar. 1951, p. 92-97.

An attempt to improve the accuracy and consistency of calculations based on the classical theory of a.c. magnetization of ferromagnetic laminae by use of a value of permeability which differs from the ratio of peak values of B and H. Calculated results for power loss and apparent permeability of Si steel samples give fairly close agreement with experiment. 13 ref. (P16, AY, SG-n)

111-P. The Effects of Radiation on Materials. J. C. Slater. *Journal of Applied Physics,* v. 22, Mar. 1951, p. 237-256.

Types of damage produced by various kinds of radiation in various solids, with relation to the theory of solid-state structure. Types of experiments which have been or could be performed to investigate radiation damage. Atomic and band pictures of solids; mechanical properties of solids; electrical and thermal conductivity; nature of radiation damage; and radiation damage to different types of materials (metals, semiconductors, ionic compounds and ceramics, and molecular solids.) (P10, M25, Q general)

112-P. The Mobility and Life of Injected Holes and Electrons in Germanium. J. R. Haynes and W. Shockley. *Physical Review,* ser. 2, v. 81, Mar. 1, 1951, p. 835-843.

Mobilities of holes injected into *n*-type Ge and of electrons injected into *p*-type Ge were determined by measuring transit time between emitter and collector in single-crystal rods. Strong electric fields in addition to those due to injected current employed so that spreading effects due to diffusion were reduced. 25 ref. (P15, Ge)

113-P. Significance of Composition of Contact Point in Rectifying Junctions on Germanium. W. G. Pfann. *Physical Review,* ser. 2, v. 81, Mar. 1, 1951, p. 882.

Experiments with *n*- and *p*-Ge transistors indicate that composition of the contact point *can* influence the properties of rectifying junctions. The significant feature of the metal point is its content of donors and acceptors. By means of an electrical treatment known as forming, it appears that donor or acceptors from the point can be introduced to or into the Ge, thereby affecting the space-charge region and the electrical properties of the junction. Two illustrations of the role of point composition in determining the properties of metal-Ge junctions are given. (P15, Ge)

114-P. Magnetic Domain Patterns on Nickel Crystals. Mikio Yamamoto and Takao Iwata. *Physical Review,* ser. 2, v. 81, Mar. 1, 1951, p. 887-888.

Magnetic powder patterns on single crystals of pure Ni whose ferromagnetic anisotropy constant is less than zero. Their interpretation. (P16, SG-n,p)

115-P. Periodic Deviations in the Schottky Effect for Polished Tantalum. G. B. Finn, W. B. LaBerge, and E. A. Coomes. *Physical Review,* ser. 2, v. 81, Mar. 1, 1951, p. 889.

Irregularities on an emitter surface may limit the accuracy with which certain observed emission phenomena can be checked against fundamental theory. To examine this limitation, Schottky data were taken on polished Ta wire and the deviations compared with data previously obtained for unpolished wire. (P15, Ta)

116-P. Anisotropy of Electrical Resistivity of Cold-Rolled Cubic Metals and Alloys. T. Broom. *Philosophical Magazine,* ser. 7, v. 42, Jan. 1951, p. 56-62.

The electrical resistivity of cold rolled Cu, low-carbon steel, brass, and sterling silver was found to vary with direction of measurement. Magnitude of the anisotropy may be qualitatively accounted for by considering the effect of oriented dislocations. Temperature coefficients of resistivity of these rolled metals are isotropic to within 0.5%. (P15, Cu, CN, Ag)

117-P. The Electrical Resistance of Gold, Silver, and Copper at Low Temperatures. E. Mendoza and J. G. Thomas. *Philosophical Magazine,* ser. 7, v. 42, Mar. 1951, p. 291-303.

A brief review of published papers on electrical resistance at very low temperatures shows that several metals exhibit a feature which has not yet been explained theoretically,

namely that the resistance goes through a minimum value as the temperature decreases. By means of an apparatus for measuring electrical resistance below 1° K. the effect was confirmed in Au and Ag and also found in Cu. 31 ref. (P15, Au, Ag, Cu)

118-P. The Thermodynamic Properties of Binary Liquid Cadmium Solutions. John F. Elliott and John Chipman. *Transactions of the Faraday Society,* v. 47, Feb. 1951, p. 138-148.

An electrode-potential study was made in the range 400-600° C. with Cd as the more electropositive component in the binary solutions Cd-Pb, Cd-Bi, Cd-Sb, and Cd-Sn. Activities and thermodynamic properties are reported for the four binary solutions at 500° C. 13 ref. (P12, Cd)

119-P. The Thermal Conductivity of a Copper-Nickel Alloy at Low Temperatures. J. K. Hulm. *Proceedings of the Physical Society,* v. 64, sec. B, Mar. 1, 1951, p. 207-211.

Thermal and electrical conductivities of an alloy of 80% Cu and 20% Ni with average crystal grain size 0.011 mm. were measured at liquid H_2 and He temperatures. Compares results with Makinson's theory. 12 ref. (P11, Cu, Ni)

120-P. Infra-Red Photoconductivity of Certain Valence Intermetallic Compounds. J. G. N. Braithwaite. *Proceedings of the Physical Society,* v. 64, sec. B, Mar. 1, 1951, p. 274-275.

The high sensitivity, but limited spectral range, of photoconductive materials such as Tl_2S, PbS, and PbTe led to a search for similar materials, sensitive to radiation of longer wavelength. Data are tabulated for Cu_2Te, Ag_2Te, ZnTe, HgTe, Tl_2Te, Sb_2Te, Mo_2Te, W_2Te, U_2Te, Zn_3As_2, SnS, and Sb_2Se_3. (P17, Te, EG-a)

121-P. Electrical Resistance of Surface Contacts on Aluminium. *Light Metals,* v. 14, Mar. 1951, p. 165-168.

Results of recent research on Al-sheathed cables and associated fittings. (P15, T1, Al)

122-P. Measurements on the Electrical Resistivity of Thin Iron Films at Liquid Helium Temperatures. (In English.) R. Lambeir, A. Van Itterbeek, and G. J. Van Den Berg. *Physica,* v. 16, Dec. 1950, p. 907-914.

At the lowest temperatures, a very steep decrease of resistance as a function of current was found to exist. This decrease is very sensitive to temperature and is connected to the temperature coefficient of the film, which depends on the kind of gas (Ne or H_2) used during sputtering. The phenomenon seems to be connected to the fact that thin films are composed of small crystals separated by very narrow channels. (P15)

123-P. Capacity and Dielectric Losses of an Oxide Layer Deposited by Anodic Oxidation on Aluminum. (In French.) W. Ch. van Geel and J. W. A. Scholte. *Philips Research Reports,* v. 6, Feb. 1951, p. 54-74.

A model of the structure of the oxide layer on Al is given, based on measurements of capacity and dielectric losses of this layer. It was found that dielectric losses decrease with increasing thickness of the oxide layer. Capacity as a function of forming voltage was measured by means of an a.c. bridge and also by a ballistic method. As a result of the measurements, a mechanism of the formation of the layer and for its dielectric behavior is postulated. (P15, L19, Al)

124-P. Electrical Properties of Gray Tin. (In Russian.) A. I. Blum and N. A. Goryunova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Nov. 21, 1950, p. 367-370.

Electroconductivity, thermal e.m.f., and Hall effect of specially prepared compacted gray Sn powder. Methods of compacting and preparation of test specimens. (P15, H14, Sn)

125-P. Some Properties and Tests of Magnetic Powders and Powder Cores. C. E. Richards, S. E. Buckley, P. R. Bardell, and A. C. Lynch. *Electrical Communication,* v. 28, Mar. 1951, p. 55-69.

Previously abstracted from *Proceedings of the Institution of Electrical Engineers.* See item 208-P, 1950. (P16, H10, Fe, Ni)

126-P. Measurement of Pressure by Means of Metallic Test-Pieces. E. Fischer. *Engineers' Digest,* v. 12, Mar. 1951, p. 94-96. (Translated and condensed.)

Previously abstracted from *Zeitschrift des Vereines Deutscher Ingenieure.* See item 51-P, 1951. (P11, Pb, Cu, Al, Ni)

127-P. Reflection and Transmission at the Surface of Metal-Plate Media. Bela A. Lengyel. *Journal of Applied Physics,* v. 22, Mar. 1951, p. 265-276.

The theory of Carlson and Heins was extended; an expression was found for reflection coefficient applicable in the presence of a diffracted beam. Tables and graphs are included for coefficients associated with electromagnetic phenomena at the surface of metal-plate media. Satisfactory agreement with theory is obtained. (P17)

128-P. Experimental Determination of the Reflection Coefficient of Metal-

Plate Media. J. Ruze and M. Young. *Journal of Applied Physics,* v. 22, Mar. 1951, p. 277-278.

A method of measuring the above at 3 cm. The technique differs from that presented in the preceding paper in that measurements are made in a closed system and back reflections are eliminated by an absorbing wedge. Angle of incidence and plate thickness are varied. Agreement with the Carlson-Heins theory is excellent for very thin plates. (P17)

129-P. Emittances of Oxidized Metals. John P. Dobbins. *American Society of Mechanical Engineers,* Paper 50-A-58, 1950, 33 pages.

Fundamental relationships are derived for computing thermal emittances of idealized composite surfaces from other known physical properties of the component materials. Practical engineering estimates of the emittances of bare and oxidized Al, Ti, and Zn may be made from known values of electrical resistivities of the metals and refractive indices of their oxides. Theoretical predictions are consistent with actual emittance measurements. 30 ref. (P11, Al, Ti, Zn)

130-P. Calculations of Surface Energy for a Free-Electron Metal. H. B. Huntington. *Physical Review,* ser. 2, v. 81, Mar. 15, 1951, p. 1035-1039.

A square-cut barrier place was used so that there was no net charge on the surface. The result is nearly independent of barrier height but leads of a value for surface tension less than half that observed for most molten metals. For sodium a self-consistent surface barrier, first developed by Bardeen, was also used in numerical computation of surface energy. The value so obtained was about half that resulting from use of the square-cut barrier. 12 ref. (P10)

131-P. Adsorption on Evaporated Tungsten Films. I. Oxygen and Carbon Monoxide Chemisorption and the Determination of Film Surface Areas. E. K. Rideal and B. M. W. Trapnell. *Proceedings of the Royal Society,* ser. A, v. 205, Feb. 22, 1951, p. 409-421.

Studied between 20 and −195° C. and at pressures up to 10^{-2} mm., with the primary aim of measuring the surface areas of the films. The two methods gave results which agree. The film areas were determined to an accuracy of about 5%. Values for the fraction of the surface atoms covered at various temperatures and pressures were obtained, together with isothermal heats at various coverages. 15 ref. (P13, W)

132-P. The Determination of the Equilibrium Constant of the Reaction Between Molten Iron and Hydrogen Sulphide. J. White and H. Skelly. *Journal of the Royal Technical College,* v. 5, Jan. 1950, p. 226-230.

Summary of a paper which appeared in *Journal of the Iron and Steel Institute.* See item 2-65, 1947. (P12, Fe)

133-P. Electron Emission Measurements in the Tungsten-Carbon and Molybdenum-Carbon Systems. (In German.) *Zeitschrift für angewandte Mathematik und Physik,* v. 2, Jan. 15, 1951, p. 49-51.

Experiments with W and Mo wires carbonized in a high vacuum with naphthalene vapor. (P15, W, Mo, C-n).

134-P. Resistance Alloys. (In German.) Hans Thomas. *Zeitschrift für Physik,* v. 129, Feb. 13, 1951, p. 219-232.

Experimental study of Ni-Cr, Fe-Al, Ni-Al, Fe-Si, Ni-Cu-Zn, Ni-Cu, and a few other alloys made to determine effect of concentration, annealing temperature and time, degree of deformation, and aging on specific resistance of the various alloys. 30 ref. (P15, SG-q)

135-P. Adsorption of Polar Organic Compounds on Steel. E. L. Cook and Norman Hackerman. *Journal of Physical & Colloid Chemistry,* v. 55, Apr. 1951, p. 549-557.

Adsorption from solution of higher-molecular-weight aliphatic acids, amines, alcohols, and certain esters on SAE 1020 steel powder with a specific surface area of 0.10 sq. m. per g. was studied. Two types of adsorption, irreversible and reversible, were observed for these systems. Extent of total adsorption was a function of a molecular weight and polar group. It was found to exceed the calculated amount necessary for a complete close-packed monolayer by 20-70%, depending on the compound. Points out importance of the results in corrosion prevention and lubrication. 11 ref. (P13, R1, ST)

136-P. A Radiographic Method of Dilatometry. A. H. Smith, N. A. Riley, and A. W. Lawson. *Review of Scientific Instruments,* v. 22, Mar. 1951, p. 138-140.

Method applied to measurements of compressibility. Metal samples are subjected to pressures up to 10,000 atm. Observations of the length of the sample are made by causing X-rays to cast a shadow on a photographic plate. Changes in length of the shadow are then determined with a comparator. This technique, which has been used to

measure the compressibilities of Al, Fe, and Cu, is easily adaptable to remote measurements of any type involving changes of length. (P10, M23)

137-P. An Automatic Magnetic Balance for the Study of Ferromagnetic Materials. R. F. S. Robertson and P. W. Selwood. *Review of Scientific Instruments,* v. 22, Mar. 1951, p. 146-152.

An instrument for plotting, automatically, magnetization-temperature curves for ferromagnetic substances. Data on performance of the instrument and sample plots of thermomagnetic runs for Ni, Fe_3O_4, and Fe_3C. 11 ref. (P16, Ni, SG-p)

138-P. Determination of Small Thermal Expansion Coefficients by a Micrometric Dilatometer Method. B. S. Lement, C. S. Roberts, and B. L. Averbach. *Review of Scientific Instruments,* v. 22, Mar. 1951, p. 194-196.

Method and apparatus for measurement near room temperature are described. Application to Invar. (P11, M23, Fe, SG-s)

139-P. Some Theorems on the Free Energies of Crystal Surfaces. Conyers Herring. *Physical Review,* ser. 2, v. 82, Apr. 1, 1951, p. 87-93.

Some theorems on relative free energies which follow from the Wulff construction for the equilibrium shape of a small particle, and some relations between atomic models of crystal surfaces and the surface-free-energy function used in this construction. Equilibrium shapes of crystals and of noncrystalline anisotropic media are classified. The condition is formulated for thermodynamic stability of a flat crystal face with respect to formation of a hill-and valley-structure. 25 ref. (P12)

140-P. Ferromagnetic Domains in Bicrystals of Nickel. Ursula M. Martius, Kenelm V. Gow, and Bruce Chalmers. *Physical Review,* ser. 2, v. 82, Apr. 1, 1951, p. 106-107.

The method of growing bicrystals of predetermined orientation developed by Chalmers was used to produce bicrystals of Mond nickel (99.92% Ni). Influence of grain boundaries on ferromagnetic domain patterns was studied. (P16, SG-p)

141-P. Observation of Magnetic Domains by the Kerr Effect. H. J. Williams, F. G. Foster, and E. A. Wood. *Physical Review,* ser. 2, v. 82, Apr. 1, 1951, p. 119-120.

Magnetic domains were observed by means of the Kerr magneto-optic effect on surfaces perpendicular and inclined to the *c* axis of hexagonal cobalt. (P16, Co, SG-n)

142-P. On the Hall Effect in Ferromagnetics. N. Rostoker and Emerson M. Pugh. *Physical Review,* ser. 2, v. 82, Apr. 1, 1951, p. 125-126.

Analysis on the basis of experimental data of A. W. Smith (1910) and some recent results reported by the authors, for Ni. (P16, P15, Ni, SG-p)

143-P. Hydrogen Overvoltage and Potential Build-Up at Copper Cathodes. A. K. Wiebe, W. Gauvin, and C. A. Winkler. *Canadian Journal of Chemistry,* v. 29, Apr. 1951, p. 301-307.

Experiments on the photo-electric effect in relation to adsorption of gases on the metal surface indicate the soundness of the belief that an adsorbed film of hydrogen is responsible for hydrogen overvoltage. 20 ref. (P15, Cu)

144-P. The Physics of Sheet Steel. (Continued). G. C. Richer. *Sheet Metal Industries,* v. 28, Mar. 1951, p. 223-227.

Power losses at high inductions of electrical steel sheets. (To be continued.) (P15, SG-h)

145-P. The Variation in Electrical Properties of Silicon-Iron Transformer Sheet; A Statistical Analysis of Data From a Single Cast. S. Rushton and D. R. G. Davies. *Journal of the Iron and Steel Institute,* v. 167, Mar. 1951, p. 247-261.

Based on 264 values from 11 ingots, and on iron-loss values of all the sheets produced from one ingot. Effect of a second anneal was studied, using analysis-of-covariance technique. Causes of variation in Fe losses. (P15, Fe)

146-P. Phenomenon of Reverse Inversion in Ferromagnetic Substances. (In Russian.) L. V. Kirenskii and V. F. Ivlev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 76, Jan. 21, 1951, p. 389-391.

Investigated for annealed Ni. It was found that the number of reverse Barkhausen peaks may be as high as 35%. (P16, SG-p)

147-P. Sintered Nickel Steels. F. Benesovsky. *Powder Metallurgy Bulletin,* v. 6, Apr. 1951, p. 18-21.

Density, hardness, tensile strength, elongation, and structure of the sintered steels 2-14% Ni and 0-0.7% C. (P10, Q27, Q29, M27, AY)

148-P. High Temperature Structure and Thermal Expansion of Some Metals as Determined by X-Ray Diffraction Data. I. Platinum, Tantalum, Niobium, and Molybdenum. James W. Edwards, Rudolph Speiser, and Herrick L. Johnston. *Journal of Applied Physics,* v. 22, Apr. 1951, p. 424-428.

Determined between 1100 and 2500° K. Quadratic equations were developed for the thermal expansion. Values of the expansion coefficient

α were computed for each of the metals, and compared with those obtained from the Groeneisen theory. 17 ref.
(P11, M22, Pt, Ta, Cb, Mo)

149-P. Interfacial Free Energy of Coherent Twin Boundaries in Copper. R. L. Fullman. *Journal of Applied Physics,* v. 22, Apr. 1951, p. 448-455.

The ratio of the above to the average grainboundary free energy in Cu was measured by means of the dihedral angles formed at the intersections of twin boundaries and grain boundaries with each other and with a Cu-Pb vapor interface. 12 ref. (P12, M27, Cu)

150-P. Crystallography and Interfacial Free Energy of Noncoherent Twin Boundaries in Copper. R. L. Fullman. *Journal of Applied Physics,* v. 22, Apr. 1951, p. 456-460.

It was found that the noncoherent twin boundary is approximately parallel to a (113) plane of one crystal and to a (335) plane of the other. The ratio of the interfacial free energy of noncoherent twin boundaries to average grain-boundary free energy in Cu was found to be 0.80: 0.015. Two measurements by a second method confirm this value.
(P12, M26, Cu)

151-P. Coefficients of Thermal Expansion of Au-Cd Alloy Containing 47.5 Atomic Percent Cd. Lo-Ching Chang. *Journal of Applied Physics,* v. 22, Apr. 1951, p. 525-526.

The X-ray single-crystal oscillation method is used. Experimental procedures, calculations, and results. (P11, Au, Cd)

152-P. The Heat of Combustion of Magnesium and Aluminum. Charles E. Holley, Jr., and Elmer J. Huber, Jr. *U. S. Atomic Energy Commission,* AECU-1172, Apr. 5, 1951, 10 pages.

Precise measurements using an oxygen bomb colorimeter of standard design. Comparison of results with those of other investigators.
(P12, Al, Mg)

153-P. An Absolute Measurement of the Susceptibility of Tantalum and Other Metals. F. E. Hoare and J. C. Walling. *Proceedings of the Physical Society,* v. 64, sec. B, Apr. 1, 1951, p. 337-341.

Magnetic susceptibility of Ta was determined absolutely. Small specimens were used to determine, by a comparative method, the susceptibilities of specimens of Pt, Pd, and Rh at 20° C. 11 ref.
(P16, Ta, Pt, Pd, Rh)

154-P. Adsorption on Evaporated Tungsten Films. II. The Chemisorption of Hydrogen and the Catalytic Parahydrogen Conversion. B. M. W. Trapnell. *Proceedings of the Royal Society,* v. 206, Mar. 22, 1951, p. 39-50.

Chemisorption of H_2 in densely packed layers on tungsten is shown to be reversible even at liquid-air temperatures. Values for fraction of surface atoms covered were obtained for various temperatures and pressures; combination of isothermal heats for high values of this fraction with previously published calorimetric heats for low values gives the heat curve for the whole range of chemisorption. Results are applied to kinetics of the parahydrogen conversion. 16 ref. (P13, W)

155-P. Some Experimental Measurements of the Inner Potentials of Various Crystals. V. F. G. Tull. *Proceedings of the Royal Society,* ser. A, v. 206, Apr. 10, 1951, p. 219-232.

Inconsistencies among previously reported measurements and their possible causes. New experiments in which no difference was found in results obtained from different surfaces of the same crystal. Measurements were also made, using fast electrons, of the inner potentials of metal crystals, and it was found that consistent results could be obtained in all cases if suitable experimental precautions were observed. It was also found that presence of a thin contaminating surface layer did not affect the results, provided the electron beam was able to penetrate the first few atomic layers of the specimen. 15 ref.
(P15, M25)

156-P. The Calculation of the Inner Potential of a Crystal. V. F. G. Tull. *Proceedings of the Royal Society,* ser. A, v. 206, Apr. 10, 1951, p. 232-241.

Although a number of calculations of inner potential have been made for various crystals, the results have been rather inconsistent. Shows that electron-distribution charts and curves obtained experimentally are not suitable for calculation of inner potential; an exponential approximation for atomic scattering factors is found to be more reliable for this purpose. A simple modification of the electron-distribution curves is obtained from these atomic-scattering factors. Results of a number of calculations based on this method compared with experimental values for metallic and nonmetallic crystals. 11 ref. (P15, M25)

157-P. Is Hooke's Law a Limiting Law? (In French.) Adrien Jaquerod. *Revue de Métallurgie,* v. 48, Feb. 1951, p. 85-90.

Experimental investigation indicates that flexion oscillations of metals and alloys are never isochronous

even at an amplitude as low as 0.5°. Similar deviations from Hooke's law were previously observed in a series of experiments based on torsion oscillations. (P21)

158-P. Electrical Properties of Gray Tin. (In German.) G. Busch, J. Wieland, and H. Zoller. *Helvetica Physica Acta,* v. 24, Feb. 15, 1951, p. 49-62.

Gray tin of high purity was prepared by prolonged cooling of spectroscopically pure metallic tin, and numerous alloys were made by adding small amounts of Al. Conductivity was determined by measuring the Q-factor of a coil containing a core of gray tin powder at frequencies up to 30 mc. per ssc. Hall effect and change of resistivity in a magnetic field were measured by conventional d.c. methods. The experiments show that gray Sn is a semiconductor of high electrical conductivity, with properties similar to those of Si and Ge. 19 ref. (P15, Sn)

159-P. Research on the Recovery of Electrical Resistance and the Thermoelectric Force of Commercial Cu Wires. (In German.) Kurt Lücke. *Zeitschrift für Metallkunde,* v. 42, Jan. 1951, p. 1-10.

Highly accurate method of measuring the effect of temperature and degree of drawing on the specific electrical resistance of different commercial Cu wires after thermal and electrical treatment. Results prove the validity of Matthiessen's rule. A difference in the recovery isotherms for resistance and for thermoelectric force was noted. (P15, Cu)

160-P. Development of Electrical Potentials of Zinc-Aluminum Alloys in Acid Electrolytes. (In German.) Georg Masing and Gisela Moldehnke-Hohmann. *Zeitschrift für Metallkunde,* v. 42, Jan. 1951, p. 19-23.

Effect of pure Al on the Zn potential in acid 0.5 *N* NaCl solutions. Changes in potentials of pure Zn and pure Al, as well as the fact that the potential of a mechanical mixture is determined by the nobler component, are explained by the very strong polarizability of Zn-rich solid solution. O_2 in the electrolyte was found to greatly reduce the polarizability of the electrode. (P15, R1, Zn)

161-P. Observations on Liquid Contact Bridges. (In German.) Gerhard Schrag and Horst Steinert. *Zeitschrift für Metallkunde,* v. 42, Jan. 1951, p. 24-26.

Experiments made to study further the formation of molten metal or metal-oxide bridges upon the opening of contacts. Data for Ni contacts are tabulated, charted, and discussed. (P15, Ni)

162-P. The Great Barkhausen Effect. Part III. Growth and Disappearance of the Remagnetization Nucleus. (In German.) Shiro Ogawa. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, May 1949, p. 53-61.

Remagnetization nuclei of an alloy wire (30% Fe, 45% Ni, 25% Co) were formed at different field strengths and their dimensions measured. Doering's diagram explains their growth and disappearance with increase and decrease of the field. Includes diagrams and graphs. (P16, SG-n)

163-P. On the Change of Reversible Susceptibility of Ferromagnetic Substances Due to Tension. (In English.) Tatsuya Katayama and Nobuhiko Kunitomi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Feb. 1950, p. 22-28.

According to the internal-stress theory of ferromagnetic substances given by Kersten and Döring, the authors calculated reversible susceptibility as a function of magnetization under various applied tensions. Theoretical reversible susceptibility thus obtained is constant at an early stage of magnetization and decreases rapidly just before magnetic saturation. But, if internal stress is larger than applied stress, it has a maximum before a sudden decrease, which occurs near magnetic saturation. These theoretical results explain experimental data qualitatively but some quantitative differences were found. (P16, SG-n, p)

164-P. Anelasticity of Ferromagnetics: Magneto-Elastic Relaxation in Nickel. (In English.) Taira Suzuki and Mikio Yamamoto. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Feb. 1950, p. 68-80.

Concerned with the relation between Bloch walls and structural imperfections in ferromagnetics, both of which are movable under an applied stress. Experimental results are discussed somewhat quantitatively from the point of view of the recent theory of the boundary layer model of mosaic structures in metals in connection with ferromagnetic domain structures. (P16, Ni, SG-n, p)

165-P. On the Electromagnetic Properties of Single Crystals of Tellurium. II. Ettingshausen-Nernst Effect. III, Adiabatic and Isothermal Hall Effect, and Ettingshausen Effect. (In English.) Tadao Fukuroi, Seiichi Tanuma, and Shotaro Tobisawa. *Science Re-*

ports of the Research Institutes, Tohoku University, ser. A, v. 2, Apr. 1950, p. 233-248.

Part II: The Ettingshausen-Nernst effect was measured from −160 to 300° C. In the intrinsic semiconductor range, it was found that coefficient of this effect is roughly in agreement with that evaluated theoretically from values of electron and hole mobilities and width of the forbidden region, which was deduced from experimental values of conductivity, Hall coefficient, and magneto-resistance coefficient measured on the same specimen. Part III: a study of adiabatic and isothermal Hall effects from −180 to 350° C. (P16, Te)

166-P. Reduction Equilibria of Iron Oxides. II. Measurement of the Equilibrium of the Reaction, FeO (I) + CO = Fe(s) + CO_2. (In English.) Koji Sanbongi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Apr. 1950, p. 296-304.

Apparatus and results. 12 ref.
(P12, D general, Fe)

167-P. Fundamental Researches on Smelting of Sulphide Ores. I. Experimental Apparatus and Method of Measurement. II. On the Equilibrium in the Reduction of Solid Ferrous Sulphide by Hydrogen Gas. III. On the Equilibrium in the Reduction of Solid Silver Sulphide by Hydrogen Gas. IV. On the Equilibrium in the Reduction of Solid Lead Sulphide by Hydrogen Gas. (In English.) Kingo Sudo. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Apr. 1950, p. 305-330.

46 references.
(P12, D general, C general, Fe, Ag, Pb)

168-P. The Change of the Electric Resistance of Bismuth Crystals in Strong Magnetic Fields. Part III. Experimental Results. (2). The Change of Resistance of Bismuth Crystals in a Magnetic Field With the Current Parallel and Being Inclined to the Direction of the Lines of Force of the Magnetic Field. (In English.) Yasaku Tanabe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Apr. 1950, p. 341-351.
(P15, Bi)

169-P. High Saturation Magnetic Alloy With a Rectangular Hysteresis Loop. J. F. Libsch and Eberhard Both. *Electrical Engineering,* v. 70, May 1951, p. 420-421.

A study was made of magnetic alloys which have approximately rectangular loops. This characteristic is desirable for materials used in saturable reactors, magnetic amplifiers, pulse transformers, and other nonlinear circuit elements. (P16, SG-p)

170-P. Thermodynamics of Iron-Silicate Slags; Slags Saturated With Gamma Iron. R. Schuhmann, Jr. and P. J. Ensio. *Journal of Metals,* v. 3, May 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 401-411.

As a first step in a study of the physical chemistry of Cu smelting slags, experimental measurements were made of the O_2 pressure of simple iron-silicate slags in equilibrium with solid Fe. The experiments consisted in bubbling CO_2-CO mixtures through the slags in Fe crucibles and in finding the equilibrium ratios of CO_2 to CO. From the data, activities and partial molal heats of solution of FeO and SiO_2 in the slags were calculated. 15 ref.
(P12, B21, Fe, Cu)

171-P. Physical and Mechanical Properties of Pure Nickel. *Nickel Bulletin,* v. 24, Jan. 1951, p. 2-5.

A tabular summary covering both high-purity and commercial Ni.
(P general, Q general, Ni)

172-P. Distribution of Energy Loss of Electrons in Aluminum. R. D. Birkhoff. *Physical Review,* ser. 2, v. 82, May 1, 1951, p. 448-449.

Conversion electrons of Ba^{137} were examined before and after passing through a thin foil of Al by means of a beta-spectrograph. (P15, Al)

173-P. Collective Electron Ferromagnetism: Rectangular Energy Bands. E. P. Wohlfarth. *Philosophical Magazine,* ser. 7, v. 42, Apr. 1951, p. 374-390.

Calculations similar to those of Stoner were carried out for an energy band for which the energy density of states is constant. Relations are derived giving dependence on temperature and interchange interaction energy of spontaneous magnetization below, and susceptibility above, the Curie point. Experimental results on magnetic properties of Ni and its alloys and on thermal properties of Ni, including energy and specific heat characteristics, temperature variation of specific heat, and magneto-caloric effect. The high-temperature specific heat of paramagnetics. 16 ref.
(P16, Ni, SG-n, p)

174-P. The Resistance-Minimum in Gold. D. K. C. MacDonald and I. M. Templeton. *Philosophical Magazine,* ser. 7, v. 42, Apr. 1951, p. 432-434.

The above phenomenon, which appears at very low temperatures, was investigated for pure specimens and for alloys containing 0.05% Cu, 0.05% Ni, or 0.2% Ni. Method of anneal-

ing was investigated as a possible variable. (P15, Au)

175-P. Surface Tension of Liquid Metals. D. V. Atterton and T. P. Hoar. *Nature*, v. 167, Apr. 14, 1951, p. 602.

Available experimental values of surface tension are plotted vs. reciprocals of the corresponding atomic volumes. Diagram snows tnat surface tension is approximately inversely proportional to atomic volume, and that the relationship holds for metals of such widely different types as Na, Bi, and Fe. (P10)

176-P. Volume Changes of an Al-Cu Alloy During the Individual Stages of Segregation. (In German.) Johann Christian Kankes and Gunther Wassermann. *Zeitschrift für Metallkunde*, v. 41, Nov. 1950, p. 381-391.

Procedure for measuring linear changes as small as 0.005%. Results for Al alloy containing 4.08% Cu indicate that aging at temperatures up to 100° C. will contract the material; between 100 and 260° C., the material expands, but again contracts above 260° C. Activation energy of the segregation process; comparative hardness tests; effect of reversed re-formation at lower temperatures. 28 ref. (P10, Al)

177-P. The Behavior of Zn in Acid Electrolytes. (In German.) Georg Masing and Gisela Moldehnke-Hohmann. *Zeitschrift für Metallkunde*, v. 41, Nov. 1950, p. 406-412.

Results of experiments indicate that Zn potential should be regarded as a composite potential of the Zn anode and the H_2 cathode. Brief tests with NaCl and Na_2SO_4 solutions saturated with air and free from air, but without Zn ions, show that potential depends on acidity of the electrolyte. Various factors affecting the behavior of Zn were investigated. 13 ref. (P15, Zn)

178-P. Kinetics of Changes of Energy Anisotropy During Superlattice Formation. (In Russian.) N. S. Akulov and E. P. Svirina. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 76, Feb. 11, 1951, p. 669-671.

Dependence of the constant of energy anisotropy in high-permeability alloys of the $FeNi_3$ type on degree of order. Curves of dependence of this constant on time of the isothermal process for different temperatures. (P16, N10, Fe, Ni)

179-P. The Melting Point-Composition Diagram of the Zirconium-Oxygen System. Daniel Cubicciotti. *Journal of the American Chemical Society*, v. 73, May 1951, p. 2032-2035.

Solidus curve of the $Zr-ZrO_2$ system was investigated by observing the melting points of wires of the oxidized metal. Results show that near the melting points O_2 dissolves to the extent of 55 at. % in solid Zr metals, while Zr dissolves in the solid dioxide to form a 15 mole % solution. No evidence found for compounds other than the dioxide. 16 ref. (P12, M24, Zr)

180-P. The Heats of Combustion and Formation of Titanium Nitride (TiN) and Titanium Carbide (TiC). George L. Humphrey. *Journal of the American Chemical Society*, v. 73, May 1951, p. 2261-2263.

Determined by burning the materials in a bomb containing O_2. Standard heats of formation were calculated from combustion data. Free energies of formation are also listed. 15 ref. (P12, Ti, C-n)

181-P. The Electrochemical Behavior of Aluminum. II. In Solutions of Iron Sulfate. J. V. Petrocelli. *Journal of the Electrochemical Society*, v. 98, May 1951, p. 183-186.

The reactivity of pure Al with Fe sulfate in solutions of varying acid strength. Electrode potentials, weight-loss data, and polarization curves show that the reaction may be interpreted from an electrochemical point of view. (P15, Al)

182-P. Varioperm Alloys With Temperature-Dependent Permeability. *Microtecnic* (English Ed.), v. 5, Jan.-Feb. 1951, p. 24-25.

Composition of these Fe-Ni alloys is such that their Curie point is in the vicinity of the ambient temperature; increased temperature brings about a marked reduction of permeability. They are made by a Swiss firm. Properties and applications are briefly outlined. (P16, Fe, Ni)

183-P. Light Refraction Functions of Thin Multiple Layers and Their Applications. (In German.) Hubert Schröder. *Zeitschrift für angewandte Physik*, v. 3, Feb. 20, 1951, p. 53-66.

Mathematical treatise demonstrates the capacity and amplifying effect of multilayer systems. Application to various problems of light refraction. The procedure can be applied to absorbing layers, and it is a convenient method of determining, from intensity measurements, the optical constants of metals. 60 ref. (P17)

184-P. The Heat of Reaction of Americium Metal With 1.5 M Hydrochloric Acid and a Note on the Heats of Formation of La^{+3} (aq.) and Pr^{+3} (aq.) H. R. Lohr and B. B. Cunningham. *Journal of the American Chemical Society*, v. 73, May 1951, p. 2025-2028.

15 references. (P12, Am)

185-P. Thermodynamic Investigations on Ternary Amalgams. Carl Wagner. *Journal of Chemical Physics,* v. 19, May 1951, p. 626-631.

Under certain conditions, interaction between positively charged metal ions in an alloy may be considered to be of minor importance as compared to interaction between conduction electrons and metal ions. Reference is made to the change in the solubility of H_2 in Cu by Zn, Sn, Al, Pt, and Ni as alloying elements; to the change in the vapor pressure of Zn dissolved in Cu by Al and Ni, and to the change in the activity of alkali metals dissolved in Hg by Tl. In addition, an equation is derived for calculation of change in activity of one metal dissolved in another metal due to the addition of a third metal, if changes in the activity coefficients with composition for the binary systems are known and interaction between positively charged metal ions can be disregarded. This relation was confirmed for several systems. 44 ref. (P12)

186-P. Partition Functions of Cubic Lattices. E. Fisher. *Journal of Chemical Physics,* v. 19, May 1951, p. 632-640.

The Born-von Karman theory of vibrational specific heats is given an analytical development that is adequate for computation even at low temperatures. Application is made to simple, body-centered, and face-centered cubic lattices. (P12, M26)

187-P. Conductivity of Cold-Worked Metals. Rolf Landauer. *Physical Review,* ser. 2, v. 82, May 15, 1951, p. 520-521.

In the vicinity of an edge-type dislocation, the density of electrons, and therefore the width of the filled portion of the conduction band is not uniform. To keep the electrons in equilibrium, an electrostatic potential is required. The scattering caused by this potential is used to calculate the increased resistance of isotropically cold worked copper. 11 ref. (P15, Cu)

188-P. A Precise Mechanical Measurement of the Gyromagnetic Ratio of Iron. G. G. Scott. *Physical Review,* ser. 2, v. 82, May 15, 1951, p. 542-547.

The sample was wound with a magnetizing coil and supported as a torsional pendulum in an evacuated space almost completely free of residual magnetic fields. Changes in pendulum amplitude were brought about by repeated and synchronized reversals of the magnetizing current. These changes were measured along with corresponding changes in magnetic moment of the sample. The average value obtained was 1.0278 ± 0.0014 times the mass-to-charge ratio of the electron. 10 ref. (P16, Fe)

189-P. Ferromagnetism in the Manganese-Indium System. Walter V. Goeddel and Don. M. Yost. *Physical Review,* ser. 2, v. 82, May 15, 1951, p. 555.

About 25 alloys, varying in Mn content from 3 to 91 wt. % were prepared. Over half of these specimens were found to be ferromagnetic. (P16, Mg, In, SG-np)

190-P. De Haas-van Alphen Effect in Aluminium and Antimony. D. Shoenberg. *Nature,* v. 167, Apr. 21, 1951, p. 646.

Values found at 4.2° K. and below. Defined as periodic field dependence of magnetic susceptibility. (P16, Al, Sb)

191-P. Linear Magnetostriction of Homogeneous Nickel Alloys. (In English.) J. J. Went. *Physica,* v. 17, Feb. 1951, p. 98-116.

Magnetostriction was measured as a function of composition, of induction caused by an external magnetic field, and of temperature. A comprehensive table of data is given. Several general relationships for binary alloys were found. From these data, the magnetostriction for ternary alloys may be calculated. 16 ref. (P16, Ni)

192-P. The Saturation Magneto-Resistance of Ferromagnetic Alloys. R. Parker. *Proceedings of the Physical Society,* v. 64, sec. A, May 1, 1951, p. 447-452.

Suggests that the magneto-resistance coefficient of a ferromagnetic alloy is composed of two terms, one associated with the temperature-dependent, the other with the temperature-independent contribution to electrical resistivity. An equation based on this hypothesis is in good agreement with experimental results for Si-Fe alloys. The validity of the equation for other alloys is discussed. 17 ref. (P16, SG-n, p)

193-P. Importance of Inhibitors and Poisons to Research on Electrochemical Processes at Metallic Boundary Layers. (In German.) Hellmut Fischer. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Mar. 1951, p. 92-97.

Effects of inhibitors on concentration overvoltage, blocking, crystallization, poisoning, and penetration; reduction and oxidation of inhibitors; changes in crystal growth; sensitivity to inhibitors, and mechanism of the coating of the electrode surface with inhibitors under the influence of electrical current. 23 ref. (P15, R10)

194-P. Importance of the Nature of the Electrode Metal to Electrolytic Reduction and Oxidation Processes. (In German.) M. von Stackelberg. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Mar. 1951, p. 120-121.

Shows that the metal not only determines the velocity constant of the reaction, but also the cause of all other electrochemical reactions in the respective electrolytes. The greater the H_2 overvoltage at the cathode, the greater is the "reducing power" of the cathode. Effects of different electrode metals. (P15)

195-P. Studies on Anodic and Cathodic Polarization of Metals. (In German.) R. Piontelli. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Mar. 1951, p. 128-143; disc., p. 143.

Theoretical and experimental research results on the electrochemical behavior of metals obtained by the author's organization during the past year. 58 ref. (P15)

196-P. The Electrochemical Characterization of Corrosion and Other Reactions in Metal-Solution Systems; The Potential-pH Diagram of the Silver-Solution System According to M. Pourbaix. (In German.) Kurt Nagel. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Mar. 1951, p. 144-145.

Discuss theoretically ion exchange in the Ag-solution system in relation to pressure and concentration. (P15, R1, Ag)

197-P. Potential Buildup on Aluminum in Aqueous Common-Salt Solution. 2. (In German.) R. Ergang, G. Masing, and M. Möhling. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Mar. 1951, p. 160-165.

After reviewing earlier work on the electrochemical behavior of Al, a study of the true polarization of anode surfaces is described. (P15, Al)

198-P. Hydrogen Overvoltage on Individual Cadmium-Crystal Surfaces. (In German.) E. Albrecht. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Mar. 1951, p. 173-174.

Experimentally determined on monocrystals of Cd. (P15, Cd)

199-P. The Time Curve of the Electrical Potential of Several Metals After Abrading Them in Vacuum. (In German.) F. Fianda and E. Lange. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Apr. 1951, p. 237-244.

Experimental results show that work function of freshly abraded metals changes rapidly. The main cause of this phenomenon is assumed to be chemisorption of O_2. Metals inevstigated were Ag, Cu, Sn, Zn, Cd, Pb, Al, and Mg. 50 ref. (P15, EG-a)

200-P. Thermal and Electrical Conductivity of Aluminum and Several Aluminum Alloys at Temperatures up to 400° C. (In German.) Walter Bungardt and Rudolph Kaltenbach. *Zeitschrift für Metallkunde,* v. 42, Mar. 1951, p. 82-91.

A stationary process for determining thermal conductivity of metals—especially suitable for above temperatures, and having an accuracy of $\pm 3\%$. Also thermal and electrical conductivities of Al and of Al-Cu-Mg and Al-Si-Cu alloys. 11 ref. (P11, P15, Al)

201-P. Thermo-Electric Homogeneity Effect in Fine-Crystalline Metal Wires. (In German.) Isolde Dietrich. *Zeitschrift für Physik,* v. 129, Apr. 1951, p. 440-448.

A theoretical and experimental study was made to determine the probability of thermo-electric homogeneity effect in Au and Pt fine-crystalline wires. Results show that the effect—if present—can scarcely be detected even with highly sensitive methods. (P15, Au, Pt)

202-P. Effect of Alloying Elements on the Electrical Resistivity of Aluminum Alloys. A. T. Robinson and J. E. Dorn. *Journal of Metals,* v. 3, June 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 457-460.

Electrical resistivities of Al alloys containing Cu, Ge, Zn, Ag, Cd, and Mg were found to increase linearly with atomic percentage of the solute atoms. Application of Linde's rule to these data suggests that each Al atom contributes 2.5 electrons to the metallic bond. 14 ref. (P15, Al)

203-P. Magnetic Properties of Nodular Cast Iron. H. E. Stauss. *Foundry Trade Journal,* v. 90, May 24, 1951, p. 553-554.

Data given by A. B. Everest in a recent paper have been re-oriented to reveal additional information comparing the magnetic properties of nodular cast irons with ordinary irons. (P16, CI)

204-P. Practical Thermodynamics. Application to the Development of Alloy Theory. G. V. Raynor. *Metal Industry,* v. 78, May 25, 1951, p. 419-421, 429.

Examples show that the practical investigation of thermodynamic quantities is of considerable importance to the development of alloy theory. (P12)

205-P. A Phenomenological Derivation of the First- and Second-Order Magnetostriction and Morphic Effects for a Nickel Crystal. W. P. Mason. *Physical Review,* v. 82, June 1, 1951, p. 715-723.

In order to account for experimental results which showed that saturation elastic constants of a single Ni crystal varied with direction of magnetization, a phenomenological investigation was made of stress, strain, and magnetic relations for single Ni crystals. The variation in elastic constants is shown to be a "morphic" effect caused by the change in the crystal symmetry due to the magnetostriction effect. Shows that the morphic effects involve six measurable constants. Some of these are evaluated experimentally. (P16, Ni)

206-P. Relation Between the Atomic Vibrations of Metals in the Solid State and Their Heat of Fusion. (In French.) Léon Jollivet. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Mar. 5, 1951, p. 966-968.

Theoretical method for determining relation. Experimental investigation on a series of elements (Al, Mg, Ca, Co, Cu, Ni, Ag, Sr, Pd, Au, Pb, Pt, Li, Na, K, Rb, and Cs) shows applicability of the method. (P12, EG-a)

207-P. Effect of Cold Working on the Electrical Resistance of Iron-Chromium-Aluminum Alloys. (In German.) Alfred Schulze. *Zeitschrift für Metallkunde,* v. 42, Apr. 1951, p. 120-122.

Measurements on four types of these alloys show that annealing increases, while deformation decreases, their resistances. (P15, Fe, Cr, Al)

208-P. The Thermodynamic Properties of Liquid Ternary Cadmium Solutions. John F. Elliot and John Chipman. *Journal of the American Chemical Society,* v. 73, June 1951, p. 2682-2693.

The ternary systems Cd-Pb-Bi, Cd-Pb-Sb, and Cd-Pb-Sn were investigated by electrode-potential methods over the range 380 to 600° C. Thermodynamic properties and activities are computed for the three ternary solutions and the Pb-Sn binary solution at 500° C. 13 ref. (P12, Cd)

209-P. Relation of Changes in the Cementite Curie Temperature to Textural Strains in Steel. D. V. Wilson. *Nature,* v. 167, June 2, 1951, p. 899-900.

Variations of the above temperature relationship in a series of cold worked steels were explored using a thermomagnetic balance similar to that developed by Sucksmith. The results do not support an explanation in terms of the production of a new carbide phase. It appears that all the cementite present is changed to some extent by even moderate cold working; and it is the extent of the change, not the proportion of cementite affected, which varies with degree of deformation. (P16, N5, ST)

210-P. Nature of the β-Phase of the Nickel-Aluminum System. (In Russian.) L. N. Guseva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Mar. 21, 1951, p. 415-418.

Changes in electrical conductivity of Ni-Al alloys with composition in the β-phase range (45.25-60 at. % Ni), were investigated. Nature of structural characteristics and transformations in this range is deduced on the basis of the results. (P15, M26, N11, Ni, Al)

211-P. (Book) **Metallurgical Thermochemistry.** O. Kubaschewski and E. Ll. Evans. 368 pages. 1950. Butterworth-Springer, London. 35 s.

Opens with an elementary account of the main thermodynamic functions used in the classical treatment of solutions and heterogeneous equilibria. Experimental techniques commonly used to obtain thermal, free-energy, and equilibrium data. Methods of estimating thermochemical data, in order that approximate calculations may be made of the thermodynamic properties of systems for which complete experimental data are not available. Thermodynamic properties for many elements and compounds of metallurgical interest. Some examples of the thermodynamic treatment of metallurgical problems. (P12)

212-P. Changing Properties of Metals by Bombarding With Electrons. *Automotive Industries,* v. 104, June 15, 1951, p. 41.

One of the latest pieces of equipment at the Atomic Research Laboratory of North American Aviation, Downey, Calif. The Statitron is a machine to displace atoms and thus change the physical properties of metals. The amount of energy required for displacement can be ascertained by determining the extent of changes in physical properties, such as electrical resistance of various metals. Applications are not discussed. (P15, Q25)

213-P. The Vapor Pressure of Zinc in the Range 300°-360° C. John E. Vance and Charles I. Whitman. *Journal of Chemical Physics,* v. 19, June 1951, p. 744-748.

Vapor pressure was measured, using Knudsen's effusion method. Temperature-vapor pressure relation was

determined in the above range. These results are about 20% higher than those previously reported. Suggests that this difference may be attributed principally to omission of a probability factor by earlier workers. 12 ref. (P12, Zn)

214-P. Absolute Rate of the Chemisorption of Hydrogen on Reduced Copper. Takao Kwan and Masaharu Kujirai. *Journal of Chemical Physics,* v. 19. June 1951, p. 798-799.

Calculations based on previously reported experimental data. Results indicate that the surface atoms of Cu are equally capable of chemisorbing H_2 molecules; therefore, the belief that only a few "active centers" appear to be responsible for chemisorption. (P13, Cu)

215-P. Thermal Conductivity of Various Materials vs. Temperatures. *Materials & Methods,* v. 33, June 1951, p. 107.

Graph gives curves for aluminized steel, pure Fe, cast iron, low-carbon steel, wrought Ni, SAE 4140, Inconel-clad Ni, stainless-clad steel, Inconel X, Vitallium HS-21, and Types 302, 321, 347, and 430 stainless steel. (P11)

216-P. Rate Processes in Physical Metallurgy. I. I. Betcherman. "Progress in Metal Physics" (Interscience Publishers, New York), p. 53-89.

Indicates how some aspects of the behavior of metals and alloys can be considered in terms of the concept of "activation energy". Among the topics discussed are: application of thermodynamics; rate processes in metallurgy; precipitation by nucleation and growth; flow of solid metals; stress-strain relationships in metals; and superlattices. 43 ref. (P12, N2, N3, N10)

217-P. Anisotropy in Metals. W. Boas and F. K. Mackenzie. "Progress in Metal Physics" (Interscience Publishers, New York), p. 90-120.

Fundamental principles. Variation in physical and mechanical properties of crystals with orientation. Experimental results on bulk and anisotropic properties of a wide variety of metals. Anisotropic variations of surface properties and effects of anisotropy in polycrystalline metals. 75 ref. (P general, Q general)

218-P. Factors Affecting the Solubility of Carbon in Iron. R. V. Reily. *Institute of British Foundrymen,* Advance Paper 997, 1951, 14 pages.

Experiments carried out in laboratory furnaces in which carefully controlled conditions were maintained. C solubility in Fe was determined in selected atmospheres of H_2, O_2, N_2, and air, at normal and low pressures and in vacuum. Shows that available knowledge on the form of liquidus of Fe-C alloys containing over 4.5% C is incomplete. Carbon solution rates in high-carbon cast iron are in conformity with the general laws relating to solution of a solid in a liquid. Shows that normal cupola atmosphere is not conductive to the production of high-C Fe. CaC_2 additions raise the C content of cupola-melted Fe. (P12, E10, CI)

219-P. Slow Neutron Cross-Sections of Zirconium and Hafnium. P. A. Egelstaff and B. T. Taylor. *Nature,* v. 167, June 2, 1951, p. 896-897.

Results of spectrometric measurements. (P10, Zr, Hf)

220-P. Microcalorimetry and Possibilities of Its Application in the Study of Metals and Alloys. (In Czech.) O. Hajicek. *Hutnické Listy,* v. 6, Mar. 1951, p. 111-119.

Although the main field of application of microcalorimetry appears to be the study of radioactive materials, of thermal phenomena of various chemical and physicochemical reactions, and in physiology and biology, it is also shown to be useful in the study of metals and alloys. 31 ref. (P12, M23)

221-P. Influence of Adsorption of Gas on Melting of Crystalline Solids. (In French.) Hubert Forestier and J. Maurer. *Comptes Rendus hebdomadaires des Seances de l'Académie des Sciences,* v. 232, Apr. 30, 1951, p. 1664-1666.

Evidence showing that melting point varies with the gaseous atmosphere present. This effect is caused by surface adsorption of gas by the crystals. The effect was studied in LiCl, KNO_3 Pb. and Sn in He. H_2, Ne, A, and CO_2. Variations of as much as 4° C. were noted. (P12, Bi, Pb, Sn)

222-P. Origin of Intermittent Activation in Ferromagnetic Substances. (In French.) Robert Forrer. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, May 7, 1951, p. 1746-1748.

Theoretical analysis of the phenomenon of ferromagnetism of metals and alloys of the Fe group. Atomic spacing is shown to play a double role. Ferromagnetic behavior of V, Cr, Mn, Fe, Co, and Ni. (P16, U, V, Cr, Mn, Fe, Co, Ni)

223-P. Secondary Electron Emission Properties of Ni, Mo, MgO, and Glass. (In German.) G. Blankenfeld. *Annalen der Physik,* ser. 6, v. 9, Mar. 15, 1951, p. 48-56.

Experimental study made to determine the effect of temperature using different primary electron energies. 10 ref. (P15, Ni, Mo)

224-P. Temperature of Two Metals in Contact. W. Karush. *U. S. Atomic Energy Commission,* AECD-2967, Dec. 22, 1944, 6 pages.

A theoretical consideration using schematic models to describe the nature of the contact between the metals. Considers the case of a chemical reaction where it is desirable to know the highest temperature at which the metals might come in contact. Shows that it is always possible with the models to have two metals in contact at a temperature as great as the larger of the two surface temperatures. (P11)

225-P. A Proposed Standard Method for Measuring the Electrical Resistance of Pipe Line Coatings. Walter F. Rogers, B. H. Davis, Lyle Sheppard, L. G. Sharpe, E. R. Allen, Donald Bond, and P. T. Miller. *Corrosion* (Technical Section), v. 7, July 1951, p. 245-251.

(P15, L26, ST)

226-P. Ignition Temperatures of Magnesium and Magnesium Alloys. W. Martin Fassell, Jr., Leonard B. Gulbransen, John R. Lewis, and J. Hugh Hamilton. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 522-528.

Simple reproducible method developed for determining the above on Mg and over 100 Mg alloys. The ignition temperature of Mg was determined in O_2-SO_2 and O_2-N_2 mixtures and in O_2 from 0.166 to 10 atm. pressure. The ignition temperature is generally lowered by alloying and increased by an increase in O_2 pressure. 15 ref. (P12, Mg)

227-P. A Thermodynamic Study of the Reaction $CaS + H_2O \rightleftarrows CaO + H_2S$ and the Desulphurization of Liquid Metals With Lime. Terkel Rosenqvist. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 535-540.

Apparatus and procedure. Applications to desulfurization of molten Cu and Fe were both thoroughly studied. 13 ref. (P12, Cu, Fe)

228-P. The Measurement of Interlaminar Resistance of Varnish-Insulated Silicon-Steel Sheet for Large Electrical Machines. E. D. Taylor. *Proceedings of the Institution of Electrical Engineers,* v. 98, pt. 2, June 1951, p. 377-385; disc., p. 385-388.

The fundamental problem is essentially statistical. Suggests a method by which it may be solved. Possibility of correlation between experimentally measured values of resistance and observed stray losses in complete machines. Other relevant factors, such as temperature, pressure, and nature of the plate surface. (P15, AY, SG-p)

229-P. Thermoelectric Properties of Titanium With Special Reference to the Allotropic Transformation. H. W. Worner. *Australian Journal of Scientific Research,* ser. A, v. 4, Mar. 1951, p. 62-83.

A differential method for determining the thermo-electric power of Ti-Pt thermocouples. Results of the differential measurements are compared with data obtained in direct e.m.f. temperature determinations. From the results, temperature dependency of the following properties was deduced: Peltier coefficient of the Ti-Pt couple; difference between the Thomson coefficients of Ti and Pt; and absolute thermo-electric power of Ti. Shows that abrupt changes in thermo-electric properties accompany the α-β transformation in refined Ti. Some effects due to preferred orientation and their elimination. (P15, N6, Ti, Pt, SG-a)

230-P. The Critical Magnetic Fields of Aluminium, Cadmium, Gallium and Zinc. B. B. Goodman and E. Mendoza. *Philosophical Magazine,* ser. 7, v. 42, June 1951, p. 594-602.

Low temperatures produced by the adiabatic demagnetization of a paramagnetic salt were used to cool specimens of Al, Cd, Ga, and Zn; their critical fields were measured down to 0.1° K. The temperature variation of the critical fields is plotted for each metal. 13 ref.

(P16, Al, Cd, Ga, An)

231-P. The Thermal Conductivity of Some Alloys at Low Temperatures. R. Berman. *Philosophical Magazine,* v. 42, June 1951, p. 642-650.

Thermal conductivities of German silver, stainless steel, and Constantan were determined between 2 and 90° K.; and electron and lattice components of the conductivity were calculated. A table shows the heat flow along specimens of each alloy resulting from temperature differences commonly met with in low-temperature work. 12 ref.

(P11, Cu, SS, Ni)

232-P. Ferromagnetism of the Alloy $FeBe_2$. (In French.) André J. P. Meyer and Pierre Taglang. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Apr. 23, 1951, p. 1545-1546.

Ferromagnetic properties were investigated. Results indicate that the Curie point is located at 643° C. Thermal-analysis further reveals the existence of a temperature of magnetic isotropy at 468° C. Above the Curie point, this alloy showed nor-

mal paramagnetism. The ferromagnatism of $FeBe_2$ may be considered as an additional argument for the hypothesis of orbital contraction in this type of alloy. Crystallography and magnetic constants of this alloy. (P16, Fe, Be)

233-P. Preparation and Magnetic Properties of Gadolinium-Magnesium Alloys Rich in Mg. (In French.) Francoise Gaume-Mahn. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, May 16, 1951, p. 1815-1816.

A thermomagnetic method for determining the presence of Gd in Mg. Preparation methods and magnetic properties for Gd-Mg alloys containing 5.3-68.2% Gd. (P16, Mg, Gd)

234-P. Ferromagnetism of the β_1-Phase of Co-Zn Alloys. (In French.) Andre J. P. Meyer and Pierre Taglang. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, May 21, 1951, p. 1914-1916.

A method for preparing an alloy of the desired Zn proportion for revealing the phase desired. Results of experiments. (P16, Co, Zn)

235-P. Effect of Radioactivity on Thermoelectronic Emission of Cathodes. (In French.) Jean Debiesse, Georges Neyret, Jean Challansonnet, and Jacques Amoignon. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, May 28, 1951, p. 2015-2016.

Research in progress on use of radioactive cathodes made of Ni alloys containing Co. (P15, Ni)

236-P. Chemical and Metallurgical Equilibria in the Work of Henry Le-Chatelier and in Experimental Science. (In French.) Maurice Rey. *Revue de Métallurgie,* v. 48, Mar. 1951, p. 161-172.

Fundamental principles of chemical equilibria of pure solids at high temperatures and equilibria of solutions, including metallic solutions and slag-metal equilibria. Includes graphs. 14 ref. (P12)

237-P. Atomic Magnetic Momenta of Fe, Co, and Ni. (In Russian.) N. S. Akulov and T. I. Kahushadzé. *Doklady Akademii SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 1, 1951, p. 593-596.

Investigation on the basis of Bohr's theory. Results indicate that the divisibility of atomic magnetic momenta and their inequality below and above the Curie point are inevitable results of the theory of interaction of electrons in the *s* and *d* bands. This theory also makes it possible to determine atomic magnetic momenta of Fe and Co at rather high temperatures. (P16, Fe, Co, Ni)

238-P. The Melting Point and the Density of Neptunium Metal. A Micro Melting Point Apparatus for Metals. Edgar F. Westrum, Jr. and LeRoy Eyring. *Journal of the American Chemical Society,* v. 73, July 1951, p. 3399-3400.

Np metal was prepared on a milligram scale by reduction of NpF_3 with Ba. The melting point was determined. Density was found to be 19.5. An apparatus was designed for measurement of melting points of 10-1000 microgram samples of metals. (P12, P10, Np)

239-P. Electrical Properties of Selenium: I. Single Crystals. H. W. Henkels. *Journal of Applied Physics,* v. 22, July 1951, p. 916-925.

Crystals of hexagonal Se were grown in a melt. Their microstructures were compared with those arising in vapor crystals. Dark resistivity was studied as a function of axis orientation, temperature, field, and time of application of a field. Thermo-electric power was measured and attempts made to measure Hall effect. Nature of the acceptor levels, approximate hole densities and mobilities, and values of activation energies. 14 ref. (P15, M26, Se)

240-P. Heat Conduction in Simple Metals. M. L. Storm. *Journal of Applied Physics,* v. 22, July 1951, p. 940-951.

Theoretical, mathematical analysis of relations between thermal parameters of simple metals on the bases of the theory of solids and available experimental data. Applications of the transformed equation to solution of problems in heat conduction. 26 ref. (P11)

241-P. Iron-Silicon Alloys Heat Treated in a Magnetic Field. Matilda Goertz. *Journal of Applied Physics,* v. 22, July 1951, p. 964-965.

Magnetic annealing was found effective for Fe-Si alloys between 2 and 10% Si, the highest maximum permeability being obtained at about 6.5%. (P16, J23, Fe, SG-n, p)

242-P. The Initial Susceptibility of Nickel Under Tension. H. J. Peppiatt and B. N. Brockhouse. *Journal of Applied Physics,* v. 22, July 1951, p. 985-986.

Results of experimental study obtained with 99.99% pure Ni wire between −40 and 120° C. (P16, Ni)

243-P. A Mechanical Model to Illustrate the Collision Mechanism of Solute Atoms or Molecules in Reactions in Liquid Solution and in Reactions at the Surface of an Interstitial Solid Solution. K. H. Jack. *Research,* v. 4, July 1951, p. 329-330.

Diagram shows model which illustrates the principle used to explain

reaction mechanisms in liquid solutions and which has also been recently applied to explain the collision mechanism of N atoms at the surface of Fe-N interstitial alloy. (P13, Fe)

244-P. The Physics of Sheet Steel. (Concluded.) G. C. Richer. *Sheet Metal Industries,* v. 28, July 1951, p. 597-602, 608.

Plastic deformation and recrystallization and their relationships to ferromagnetic properties. Includes summary discussion covering the entire series. 31 ref. (P16, Q24, N5, ST)

245-P. Application of Thermodynamics to the Manufacture of Iron and Steel. (In French.) Charles Goodeve and J. Pearson. *Revue de Métallurgie,* v. 48, May 1951, p. 329-335; disc., p. 335.

Reviews the above and considers desulfurization and dephosphorization. 15 ref. (P12, ST)

246-P. Wetting of Metals by Water. (In German.) J. L. v. Eichborn. *Werkstoffe und Korrosion,* v. 2, June 1951, p. 212-221.

Results of investigation and original experiments with Hg. Survey of surface tensions and heat of adsorption of metallic catalysts yields comparative values for adsorptive ability of various metallic surfaces. Proposes hypothesis for adhesion of traces of water. 67 ref. (P10, Hg)

247-P. Le Chatelier's Principle and Its Metallurgical Applications. (In French.) M. B. Bever and R. Rocca. *Revue de Métallurgie,* v. 48, May 1951, p. 363-368.

The principle is reviewed and applied to effects of temperature and pressure changes on chemical reactions and phase changes. 32 ref. (P12)

248-P. The Densities of Liquid Mg_2Pb and Mg_3Bi_2. (In German.) Oswald Kubaschewski and Reinhold Hörnle. *Zeitschrift für Metallkunde,* v. 42, May 1951, p. 129-132.

Experiments show that Mg_3Bi_2 contracts when formed in the solid state, but expands when formed in the molten state, while Mg_2Pb manifests the opposite behavior. Volume changes in formation of liquid alloys are discussed on the basis of known data on metallic, homopolar, and heteropolar bonding mechanisms. 17 ref. (P10, Mg, Bi, Pb)

249-P. Are There Magnetic Indications of Negative Cobalt and Iron Ions in Alloy Melts and Very Dilute Solid-Solution Alloys? (In German.) Eckhart Vogt. *Zeitschrift für Metallkunde,* v. 42, May 1951, p. 155-158.

Magnetic measurements of Weil on melts of Co and Fe with Au, Zn, and Sb; and those of Bitler and coworkers on very dilute solid-solution alloys of Fe in Cu at very low temperatures. 13 ref. (P16)

250-P. On the Theory of the Hall Effect. H. Koppe and J. M. Bryan. *Canadian Journal of Physics,* v. 29, July 1951, p. 274-284.

A phenomenological theory of the Hall effect is applied to the effect of an inhomogenous magnetic field on the Hall effect in thin layers, the magnetic increase of resistivity under the same conditions, and the Hall effect in a homogenous magnetic field in inhomogenous layers. Gives a simple kinetic theory. (P15)

251-P. Metallic Conduction—The "Internal Size-Effect". D. K. C. MacDonald. *Philosophical Magazine,* ser. 7, v. 42, July 1951, p. 756-761.

The conception as an "internal size-effect" of internal boundaries in a metal is proposed and discussed in relation to a number of problems. The behavior of the electrical resistance under a magnetic field is of particular interest and it is suggested that this may be relevant to the anomalous effects observed in gold (and other metals) at low temperatures and to the peculiar magnetoresistive characteristics of ferromagnetics. 16 ref. (P16, Au)

252-P. The Atomic Heats of the Rare-Earth Elements. D. H. Parkinson, F. E. Simon, and F. H. Spedding. *Proceedings of the Royal Society,* ser. A, v. 207, June 22, 1951, p. 137-155.

Atomic heats of La, Ce, Pr, and Nd were measured from 2 to 180° K. La shows an anomaly corresponding to superconductivity at 4·37° K. Ce, Pr, and Nd all behave anomalously. A theoretical explanation is attempted. 31 ref. (P12, EG-g)

253-P. Torque Curves and Other Magnetic Properties of Alcomax. K. Hoselitz and M. McCaig. *Proceedings of the Physical Society,* v. 64, sec. B., July 1, 1951, p. 549-559.

Using a torque magnetometer, the crystal anisotropy constants of the permanent magnet alloy Alcomax III were determined. The changes in crystal anisotropy are compared with parallel measurements on the hysteresis curve. A direct experiment shows that when the field applied during cooling makes an angle with the crystal axes, the preferred direction is much nearer to a (100) axis than the field direction. (P16, SG-n)

254-P. Change of the Sign of Magnetostriction as the Result of Expansive Stresses. II. (In German.) A.

Elsas and E. Vogt. *Zeitschrift für Naturforschung,* v. 6a, May 1951, p. 233-238.

Results of measurements of magnetostriction on a Hensler alloy (74.2% Cu, 15.2% Mn, 10.1% Al), an Fe-Ni alloy, and Ni. In certain Fe-Ni alloys, high tensile stresses are found to reverse the positive sign of magnetostriction despite the fact that the magnetostriction of monocrystals is positive in all directions. This change in sign can be explained by the very great anisotropy of magnetostriction. (P16, Cu, Fe, Ni)

255-P. Report of Committee B-4 on Electrical Heating, Resistance, and Related Alloys. S. A. Standing, chairman. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 139-158.

Previously abstracted from *American Society for Testing Materials,* Preprint 10, 1950. See item 198-P, 1950. (P15, S22, SG-q)

256-P. Heat Conductivity of Steels and a Few Other Metals at Low Temperatures. J. De Nobel. *Physica,* v. 17, May 1951, p. 551-562.

Heat conductivities of Al, Fe, Ni, monel metal and of Ni, Mn, and Cr steels were investigated at the temperatures of liquid hydrogen and liquid air. The two methods employed to measure heat conductivities are described and results are given. 20 ref. (P11, Al, Fe, Ni, AY)

257-P. Reduction of Ferrous Oxides. O. H. Gellner and F. D. Richardson. *Nature,* v. 168, July 7, 1951, p. 23-24.

Layers of wüstite approximately 10^{-2} mm. thick were prepared by passing controlled mixtures of H_2 and water vapor over strips of the Fe at 900 and 950° C. Layers were then reduced in H_2 at temperatures ranging from 600 to 1000° C. Kinetics of the reduction were studied and the mechanisms followed by microscopic examination. (P13, Fe)

258-P. Growth Characteristics of Some Cast Irons Used for Ingot Moulds. W. C. Heselwood and F. B. Pickering. *Journal of the Iron and Steel Institute,* v. 168, July 1951, p. 277-286.

Repeated heating and cooling tests were followed by determination of the isothermal growth at different temperatures, and the measurement of growth occurring during 5 hr. at 700° C. under conditions of limited access of air (to minimize scaling) was finally adopted as an arbitrary test, and was applied to 16 irons of differing analyses. From the results, a tentative relationship was obtained indicating the influence of Si, Mn, and P on susceptibility to growth. The mechanism of growth in cast irons is discussed, and a suggested mechanism is tested experimentally. (P10, CI)

259-P. Magnetic Properties of Spheroidal-Graphite Iron. K. G. Hinton. *Foundry Trade Journal,* v. 91, July 19, 1951, p. 69-70.

Critically discusses recent paper by H. E. Stauss (May 24, 1951; see item 203-P, 1951.) Comparative data obtained by Stauss and the writer are charted and discussed. (P16, CI)

260-P. Statistical Study of Some Factors Related to Cast-Iron Composition for Blast Furnaces. (In French.) P. Rocquet and C. G. Thibaut. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 303-313.

Effect of temperature, relation of Si and S contained in cast iron, and relation between composition of cast iron and that of slag. (P12, Fe)

261-P. Methods of Measuring Thermal Conductivity of Solids. (In French.) Pierre Vernotte. *Métaux; Corrosion-Industries,* v. 26, May 1951, p. 216-217.

A critical review of two methods. (P11)

262-P. Radioactivity of Natural Bismuth. (In French.) Henriette Faraggi and André Berthelot. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, June 4, 1951, p. 2093-2095.

Examination of nuclear emulsions impregnated with Bi and preserved under proper conditions for two years favors the assumption of alpha-radiation of Bi. (P13, Bi)

263-P. Ferromagnetic Properties of "Semioxidic" Iron and Iron-Cobalt Powders. (In German.) F. Lihl. *Acta Physica Austriaca,* v. 4, May 1951, p. 360-379.

Semioxidic iron is defined as a carbonaceous oxide whose iron content is the same as FeO. Pressed bodies of bivalent iron formate and oxalate and of iron-cobalt formate solid solution were used to determine effect of time and temperature of reduction on coercive force, remanence, and energy content. Results are found to agree with Néel's theory on the coercive force of very fine ferromagnetic powders. (P16, Fe, Co)

264-P. The Properties of Binary Mixtures of Metals. (In German.) W. Späth. *Metall,* v. 5, July 1951, p. 295-299.

Shows that simple basic assumptions can be used to derive a number of physical property curves for binary mixtures, which closely agree with experimentally determined curves. (P general)

265-P. Change of the Electric Resistance of Pure Metals at the Melting Point. (In German.) *Naturwissenschaften,* v. 38, (1st Apr. No.), 1951, p. 158-159.

Explains theoretically the relatively low change in electrical resistance of melting metals. (P15)

266-P. The Effect of Brillouin Zones on the Physicochemical Properties of Alloys. (In German.) *Naturwissenschaften,* v. 38, (2nd Apr. No.) 1951, p. 185-186.

Investigated by a study of constitution diagram, magnetic susceptibility, and H_2-solubility of the quasi-binary $MgCu_2$-$MgZn_2$ system. (P16, M24, Mg, Cu, Zn)

267-P. Electron Emission From Metal Surfaces as After-Effect of Mechanical Working or Exposure to Glow Discharge. (In German.) O. Haxel, F. G. Houtermans, and K. Seeger. *Zeitschrift für Physik,* v. 130, No. 1, 1951, p. 109-123.

Grinding a metal surface with emery cloth or exposing it to a glow discharge results in a gradually fading electron emission. Method of measuring strength, duration, and temperature effect on electron emission. Results show that the product of strength and duration is always the same. 16 ref. (P15)

268-P. The Atomic Heats of Several Metals. (In German.) Oswald Kubaschewski. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 445-451.

Published data on the atomic heats of Li, Mg, Ca, Ba, Tl, P, Bi, Se, Te, Ni, and Fe, determined above and below their melting points, are compared in order to determine most probable atomic heats. A formula on atomic heats, used in thermochemical computations, is presented, its validity range indicated, and its probable degree of accuracy estimated. 82 ref. (P12)

269-P. Magnetic Properties of Amalgams of the Ferrous Metals. (In German.) Franz Pawlek. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 451-453.

Method of preparing amalgams and of investigating them by X-ray and magnetic methods. Electrolytic deposition of iron on Hg cathodes is shown to form no amalgams. Of three amalgams of Ni, Co, and Mn, only Co amalgam is found to have magnetic properties. 11 ref. (P16, Fe, Ni, Co, Mn)

270-P. Effect of Atomic Volume on the Heat of Formation of Solid Solutions of Binary Metallic Systems. (In German.) Theo Heumann. *Zeitschrift für Metallkunde,* v. 42, June 1951, p. 182-189.

Shows that a lattice is distorted by incorporation of foreign atoms that are greater or smaller than atoms of the basic lattice. Endothermal energy of distortion can be roughly computed from a simple lattice model, and this energy adds to total heat of formation and frequently decides mutual behavior of two metals. 23 ref. (P12, N12)

271-P. Thermodynamic Functions of Iron. L. S. Darken and R. P. Smith. *Industrial and Engineering Chemistry,* v. 43, Aug. 1951, p. 1815-1820.

Reviews the thermal properties of Fe and combines them with equilibrium data to obtain a consistent tabulation of various thermodynamic functions for body-centered cubic and face-centered cubic iron from 298 to 2000° K. and for liquid iron from 1300 to 2000° K. 35 ref. (P12, Fe)

272-P. On the Freezing Point Diagram of the Germanium-Manganese System. James H. Downing and Daniel Cubicciotti. *Journal of the American Chemical Society,* v. 73, Aug. 1951, p. 4025.

Results of experiments covering the range 0-32 at. % Mn are charted. (P12, Ge, Mn)

273-P. A Study of Metallic Electrodes Prepared by Sublimation. Benjamin C. Bradshaw. *Journal of Chemical Physics,* v. 19, Aug. 1951, 1026-1027.

Relative emf. of Zn crystals deposited from the vapor phase in high vacuum was measured and found to be of the order of 100 microvolts. Concludes that Zn crystals formed by evaporation are practically strain-free and, as such, are highly suitable where reversible Zn electrodes are needed. (P15, T29, Zn)

274-P. Electrical Conductivity of Metals and Alloys. *Metal Finishing,* v. 48, Aug. 1951, p. 75.

A table covering 40 common types. (P15)

275-P. Superconductivity of Lead Isotopes. Marianne Olsen. *Nature,* v. 168, Aug. 11, 1951, p. 245-246.

Measurements of transition temperature were carried out on two Pb samples with mean atomic weights of 206.15 and 207.72. 10 ref. (P15, Pb)

276-P. Secondary Emission of Electrons From Liquid Metal Surfaces. James J. Brophy. *Physical Review,* ser. 2, v. 83, Aug. 1951, p. 534-536.

Secondary-emission ratio as a function of primary energy was determined for targets of Bi, Ga, Pb, Ha for both the liquid and solid state. The secondary-emission characteristics of liquid surfaces are shown to be very nearly like those of solid surfaces; and, in general, the shape

of the secondary-emission curves for these materials is similar to those for other pure metals. Compares observed maximum secondary ratios with predicted values. (P15, Bi, Pb, Ga, Hg)

277-P. Domain Patterns on Nickel. H. J. Williams and J. G. Walker. *Physical Review,* ser 2, v. 83, Aug. 1951, p. 634-636.

Domain patterns were observed on two single crystals of Ni cut in the form of hollow parallelograms. The sides were parallel to the (111) directions in one specimen and to the (110) directions in the other. The crystals show domain structures with the three types of domain boundaries which are to be expected from a material having the directions of easy magnetization along the (111) directions. Domain boundary movement under the influence of an applied magnetic field was observed. (P16, Ni, SG-n, p)

278-P. The Influence of Magnetization on Ultrasonic Attenuation in a Single Crystal of Nickel or Iron-Silicon. Sheldon Levy and Rohn Truell. *Physical Review,* ser. 2, v. 83, Aug. 1951, p. 668-669.

Results of experiments with Ni crystals and with Fe + 3% Si crystals. (P10, P16, Fe, Ni)

279-P. Domain Wall Relaxation in Nickel. W. P. Mason. *Physical Review,* ser. 2, v. 83, Aug. 1951, p. 683-684.

Recent measurements of decrement and difference between magnetically saturated and demagnetized elastic constants (the ΔE Effect) of Ni have shown that these effects are much smaller at 10 megacycles than they are in the low-frequency range. Complete decrement-frequency and ΔE-frequency curves were measured on a well-annealed polycrystalline Ni rod. (P16, Ni)

280-P. The Spontaneous Magnetization of Cobalt. H. P. Myers and W. Sucksmith. *Proceedings of the Royal Society,* ser. A, v. 207, July 23, 1951, p. 427-446.

Measurements of the spontaneous magnetization of pure specimens of single-crystal, close-packed hexagonal and polycrystalline face-centered cubic Co between −183 and 1121° C. 13 ref. (P16, Co, SG-n)

281-P. Conductivity, Hall Effect and Thermo-Electric Power of Selenium Single Crystals. K. W. Plessner. *Proceedings of the Physical Society,* v. 64, sec. B, Aug. 1951, p. 671-681.

Single crystals of Se were grown from the vapor phase and their conductivity and thermoelectric power measured over a range of temperatures. Hall effect was determined for one crystal. Conductivity obeys a relatively simple exponential law. 13 ref. (P15, Se)

282-P. Conductivity and Hall Effect of Micro-Crystalline Selenium Containing Iodine Impurities. K. W. Plessner. *Proceedings of the Physical Society,* v. 64, sec. B, Aug. 1951, p. 681-690.

Measurement as a function of iodine content under two different conditions of crystallization, over a range of temperatures. Conductivity increases with iodine concentration, a maximum being reached at about 0.03%. Hall effect shows this increase to be due to an increasing mobility, carrier concentration remaining nearly constant With increasing temperature, mobility rises and carrier concentration falls. Results are discussed in terms of grain structure. 15 ref. (P15, Se)

283-P. On θ Values in the Resistance of Metal. M. Blackman. *Proceedings of the Physical Society,* v. 64, sec. A, Aug. 1951, p. 681-683.

The θ value to be expected on the basis of the Bloch theory of temperature dependence of resistance of metals is shown to be much larger than that observed experimentally. Data for Li, Na, and Cu are tabulated. (P15, Li, Na, Cu)

284-P. Magnetic Materials and Ferromagnetism. A. E. DeBarr. *Research,* v. 4, Aug. 1951, p. 366-371.

Reviews domain theory of ferromagnetism, grain-oriented materials, domain orientation (magnetic annealing), permanent magnet materials, high-permeability materials, and ferrospinels (ferrites). 24 ref. (P16, SG-n, p)

285-P. The Dimensional Behavior of Invar. B. S. Lement, B. L. Averbach, and Morris Cohen. *Transactions of American Society for Metals,* v. 43, 1951, p. 1072-1097.

Previously abstracted from *American Society for Metals,* Preprint 39, 1950. See item 312-P, 1950. (P11, Fe, SG-s)

286-P. Variation of the Magnetic Saturation of Iron During Highly Elastic Compression. (In Russian.) F. Gal'perin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser., v. 78, May 21, 1951, p. 451-452.

Results of experimental and theoretical investigation. (P16, Fe, SG-n, p)

287-P. Theory of Emission of Electrons from Metals in an Electrical Field. (In Russian.) A. E. Glauberman and I. I. Tal'yanskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 78, June 1, 1951, p. 661-664.

A theoretical, mathematical analysis. (P15)

288-P. Critical Magnetic Field of Superconducting Tin Films. (In Russian). N. V. Zavaritskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 78, June 1, 1951, p. 665-668.

Films were deposited on glass plates by vacuum deposition in accurate thicknesses varying from 4.4 x 10^{-6} to 1.5 x 10^{-4} cm. Data on variation of superconducting properties with film thickness and temperature are charted. (P15, P16, Sn)

289-P. One Requisite for Accurate Determination of Boundary Solubility in Binary Metallic Systems. (In Russian.) S. Kh. Kipnis and I. L. Rogel'berg. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser., v. 78, June 1, 1951, p. 701-703.

Mathematical procedure and results of its application to calculation of heats of solution for the system Au-In between 400 and 685° C. The same method was also applied to Bi in Mg, to Co in Cu, and to the Al-Li, Au-Ge, Mg-Pb, Au-Al, and Au-Sn systems. (P12)

290-P. The Principles of Thermodynamics. P. W. Bridgman. *American Society for Metals,* "Thermodynamics in Physical Metallurgy", 1950, p. 1-15.

A brief introduction to the other papers in the book. (P12)

291-P. The Role of Statistical Mechanics in Physical Metallurgy. C. Zener. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 16-27; disc., p. 27.

Attempts to explain the above in simple terms. Graphs illustrate principles involved. (P12)

292-P. Application of Thermodynamics to Heterogeneous Equilibria. L. S. Darken. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 28-46.

Principle of continuity and thermodynamic functions for iron; free-energy diagrams; metastable phenomena; experimental determination of free energy; multicomponent systems; and extra-thermodynamic theory. (P12)

293-P. The Thermodynamics of Liquid Metallic Solutions. John Chipman and John F. Elliott. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 102-143.

Liquid solutions have been more extensively investigated than solids, especially with regard to the thermodynamic properties free energy, enthalpy, and entropy. Much less attention has been given to specific volumes and coefficients of expansion and compressibility. Primary purpose is to review experimental methods for study of these quantities. 139 ref. (P12)

294-P. Contribution of Thermodynamics to Metallurgical Research and Operations. J. B. Austin. *American Society for Metals,* "Thermodynamics in Physical Metallurgy," 1950, p. 307-319.

Contributions in diverse fields such as process metallurgy (ferrous and nonferrous), phase relationships and transformations, gas-metal equilibria, corrosion, electroplating, etc. 37 ref. (P12)

295-P. Chemistry in Metal Extraction. *Chemical Age,* v. 65, Aug. 1951, p. 214-216. (Condensed from paper by F. D. Richardson.)

As applied to smelting and refining at high temperatures. Refers to both ferrous and nonferrous metals. (P13, C21, D general)

296-P. Pulse-Annealing for the Study of Relaxation Processes in Solids. W. E. Parkins, G. J. Dienes, and F. W. Brown. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1012-1019.

A new experimental technique for studying rate processes in solids. The method, termed "pulse-annealing," involves direct heating of a very small sample to a chosen annealing temperature for a short period, followed by rapid cooling to some fixed temperature for an in-place physical-property measurement. The method is a very flexible one, as the above cycle may be repeated to obtain any desired time-temperature history. General experimental techniques and specific application to graphite and metals, particularly for changes in electrical resistivity.
(P general, J23, N general)

297-P. On Linear Expansion Coefficient and Melting Point of Metals. G. Bonfiglioli and G. Montalenti. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1089-1090.

Relationship between linear expansion coefficient and melting point of metals. Data are tabulated for 30 metals or phase modifications.
(P11, P12)

298-P. Specific Heat of Metals at Low Temperatures. *Nature,* v. 168, Aug. 18, 1951, p. 281-282.

Discusses the above with reference to interaction in a metal between the lattice vibrations and the conduction electrons. Graphs and equations. (P12)

299-P. Surface Tension of Liquid Metals. R. A. Weale and S. W. Smith. *Nature,* v. 168, Aug. 25, 1951, p. 343-344.

Separate communications from above authors, with reference to a recent communication from Atterton and Hoar, concerning the conclusion that surface tension is approximately inversely proportional to atomic volume. (P10)

300-P. The Magneto-Resistance Effect in Oriented Single Crystals of Germanium. G. L. Pearson and H. Suhl. *Physical Review,* ser. 2, v. 83, Aug. 15, 1951, p. 768-776.

Magneto-resistance measurements on single-crystal samples of Ge as a function of orientation of electric and magnetic fields with respect to crystal axes. Other variables studied were strength of magnetic field, temperature, and type of conduction (either by holes or electrons.) Numerical results are compared with Seitz's theoretical equations, from which the fundamental magneto-resistance constants are obtained. Certain discrepancies between theory and experiment lend weight to a more sophisticated model recently treated by Shockley. 14 ref. (P16, Ge)

301-P. Relation of Antiferromagnetic Structure to the Binding Energies of Some b.c.c. Transition Metals. Yee-Chuang Hsu. *Physical Review,* ser. 2, v. 83, Sept. 1, 1951, p. 975-979.

Zener's theory of antiferromagnetic structure for V, Cr, Nb, Mo, Ta, and W is discussed from the point of view of binding energy. According to such a picture the large binding energies must come from coulomb interaction between cores. Importance of the outer *d* electrons in achieving large coulomb attraction. A mathematical scheme for treating binding energy in the case of extensive overlap of cores. Results obtained demonstrate the importance of the coulomb attractive energy in an antiferromagnetic structure.
(P16, V*, Cr, Nb, Mo, Ta, W)

302-P. On the Theory of Free Electron Ferromagnetism. A. B. Lidiard. *Proceedings of the Physical Society,* v. 64, sec. A, Sept. 1, 1951, p. 814-825.

A calculation was made of the ferromagnetic properties of a system of electrons using plane wave functions and Bloch exchange integrals. Results show that below a critical temperature T_c the spontaneous magnetization decreases slowly with increasing temperature. At T_c the magnetization drops suddenly to a zero as if a change of phase were taking place and there is therefore a latent heat of demagnetization at this temperature. Above T_c the model is paramagnetic. 12 ref. (P16)

303-P. Reversible Effects in the Magnetization of Nickel. R. S. Tebble, W. D. Corner and J. E. Wood. *Proceedings of the Physical Society,* v. 64, sec. B, Sept. 1, 1951, p. 753-760.

Investigations of the temperature dependence of the contribution from reversible processes to the magnetization of annealed and strained Ni wires. (P16, Ni)

304-P. Optical Properties of Selenium. J. J. Dowd. *Proceedings of the Physical Society,* v. 64, sec. B, Sept. 1, 1951, p. 783-789.

Measurements were made of the refractive index of amorphous Se in the red and near infrared spectral region. The absorption coefficient of amorphous Se was measured in the ultraviolet, visible and near infrared regions. The transmission coefficients of several single crystals of Se were measured and an estimate made of the absorption coefficient in the wavelength range 0.68 to 2.0 μ. 14 ref. (P17, Se)

305-P. Physical and Chemical Adsorption of Long Chain Compounds on Radioactive Metals. F. P. Bowden and A. C. Moore. *Transactions of the Faraday Society,* v. 47, Aug. 1951, p. 900-908.

Experiments using radioactive metal foils show that adsorption of a long-chain fatty acid, alcohol, or ester on Pt or Au is physical. On Zn, Cd, or Cu the adsorption may be followed by chemical reaction. Electron-diffraction studies confirm the view that chemical reaction may occur at the metal surface and the results are correlated with the lubricating properties of the acid, alcohol, and ester on various metal substrates. 14 ref.
(P13, Pt, Au, Zn, Cd, Cu)

306-P. Influence of Carbon on the Activity of Sulfur Dissolved in Molten Iron. (In Russian.) S. M. Samarin and L. A. Shvartsman. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1951, p. 407-410.

Influence of carbon may be calculated on assumption that number of locations of carbon and sulfur in this solution equals approximately ¼ the number of iron atoms, so that atoms of both sulfur and carbon cannot be found simultaneously in one elementary "nucleus". 10 ref.
(P12, Fe)

307-P. (Book) **Ferromagnetism.** Richard M. Bozorth. 968 pages. 1951. D. Van Nostrand Co., 250 Fourth Ave., New York 3, N. Y.

A practical sourcebook covering the entire field of ferromagnetism, from the fundamental magnetic particle and the spinning electron, to complex alloys. The presentation is mainly descriptive and nonmathematical when discussing materials. Emphasis is on physical concepts when discussing theory. Manufacturing methods are outlined, with special reference to materials of commercial importance such as the permalloys, grain-oriented silicon iron,

the alnicos, and the ferrites. Part I: introduction, covering concepts of ferromagnetism. Part II: magnetic and related properties of known ferromagnetic materials. Part III: the physical phenomena of ferromagnetism. Part IV and the Appendices: methods of measurement of magnetic quantities, and tabulations of the more important physical and magnetic properties of ferromagnetic materials. (P16, SG-n, p)

308-P. (Book) **Fundamentals of Metallurgy.** (In Russian.) H. K. Austisian. 287 pages. 1947. State Publishing House for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

Provides good coverage of metallurgically important thermodynamic relationships, deriving the phase rule, describing binary, ternary, and quaternary constitutional diagrams, similarly introducing ionics and electrochemical theory. Construction and general principles of operation of ferrous and nonferrous furnaces, including the blast furnace; concentrating, drying and roasting of ore; dust collecting; hydrometallurgy, ferrous and nonferrous: distillation and sublimation; gaseous reduction —principally H_2 and CO processes for iron ore; slag and slag-metal theory.
(P12, B general, C general, D general)

309-P. (Book) **Thermodynamics in Physical Metallurgy.** 319 pages. 1950. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

Papers presented at 31st National Metal Congress Cleveland, Oct. 15-21, 1949. The first seven lectures deal with essentially equilibrium phenomena. The following six lectures touch upon various essential irreversible phenomena. Individual papers are abstracted separately.
(P12, N general, M24)

310-P. Physical Chemistry of High-Temperature Reactions. John Chipman. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 531-591.

A concise review of principles of physical chemistry that have proved useful in studies of steelmaking. Data that are essential to the application of physical chemistry to reactions at high temperatures. 44 ref.
(P12, D general)

311-P. Kinetics of Metallurgical Processes. Lawrence S. Darken. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 592-620.

Rate theory, diffusion, thermal conductivity and diffusion, and nucleation and growth process. 21 ref.
(P12, N1, N2)

312-P. Physical Chemistry of Liquid Steel. John Chipman. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 621-690.

Properties of iron at high temperatures; chemical reactions in liquid steel; activity and free energy in liquid steel; oxidation and deoxidation equilibria; reactions of sulfur in liquid steel; removal of nitrogen; and hydrogen in liquid steel. 51 ref.
(P12, D2, Fe, ST)

313-P. The Electron Theory of Solids. J. C. Slater. *American Journal of Physics,* v. 19, Sept. 1951, p. 368-374.

The original ideas of Lorentz and Drude on the electron theory of solids have been expanded to cover the quantum theory of the electron gas, the energy-band theory, with applications to the distinction between conductors, semiconductors, and insulators, and to treat not only electrical conductivity, but mechanical, thermal, and magnetic properties of solids, and a wide range of phenomena. (P15, Q general)

314-P. Surface Tension of Liquid Metals. N. R. Mukherjee. *Journal of Applied Physics,* v. 22, Sept. 1951, p. 1215-1216.

Surveys the literature. Surface tension of liquid metals is believed to be proportional to their molar latent heat of fusion. (P10)

315-P. Contact Potential Differences. Imre F. Patai and Martin A. Pomerantz. *Journal of the Franklin Institute,* v. 252, Sept. 1951, p. 239-260.

Fundamental aspects, with critical consideration of experimental methods of determining contact-potential differences. Small temperature effects which are known to occur, but which are orders of magnitude smaller than contact potentials, are not mentioned. The additional complications inherent in the nature of the contact between a metal and a semiconductor are avoided by restricting the discussions to metals only. 87 ref. (P15)

316-P. Reflection and Transmission of Radiation by Metal Films and the Influence of Nonabsorbing Backings. Louis Harris, John K. Beasley, and Arthur L. Loeb. *Journal of the Optical Society of America,* v. 41, Sept. 1951, p. 604-614.

A set of equations is presented. Using these equations, the results of two different methods of calculation of the reflection and transmission coefficient of a thick nonabsorbing plate are shown to be practically identical, both with and without an absorbing (metal) film on one surface of the plate. (P17)

317-P. Wave Propagation in One-Dimensional Structures. J. M. Luttinger. *Philips Research Reports,* v. 6, Aug. 1951, p. 303-310.

A conjecture of Saxon and Hutner on the forbidden energy levels of any substitutional alloy of a certain one-dimensional crystal model is proven. Analogous results are derived for wave transmission down a line loaded with two-terminals. (P15)

318-P. The Characteristic Odor of Nodular Iron Fractures and Carbide Slags. B. F. Brown. *Foundry,* v. 79, Oct. 1951, p. 174.

The odor is attributed to PH_3 and to a lesser extent to H_2S. Equations for the reactions involved are given. (P13, CI, C-n)

319-P. Proposed Method for Measuring Electrical Resistance of Coatings. Walter F. Rogers, B. H. Davis, Lyle Sheppard, L. G. Sharp, E. R. Allen, Donald Bond, and P. T. Miller. *Gas Age,* v. 108, Sept. 27, 1951, p. 31-35, 70-72.

Previously abstracted from *Corrosion.* (Technical Section). See item 225-P, 1951. (P15, L26, ST)

320-P. Thermogalvanic Potentials. I. The Application of Thermodynamics to Thermogalvanic Data (A Study of the Silver Chloride Electrode from 25° to 90° C). Harry Levin and Charles F. Bonilla. *Journal of the Electrochemical Society,* v. 98, Oct. 1951, p. 388-394.

Probability that thermogalvanic data may find application in the approximate determination of thermodynamic constants, in the measurement of concentration changes in industrial processes, and in the interpretation of thermal corrosion. (P12, R1)

321-P. The Kinetics of the Reduction of Iron Oxide Above 1400° C. T. E. Dancy. *Journal of the Iron and Steel Institute,* v. 169, Sept. 1951, p. 17-24.

An apparatus was developed for the study of the very rapid reduction of FeO and Fe_3O_4 by carbon in molten pig iron. Oxide attack on the refractory was prevented by using a spinning crucible, and the reaction was followed by motion-picture recording of a low-inertia pressure gage. Temperature coefficients determined from activation energy and from "order of reaction" curves showed reasonable agreement. (P12, Fe)

322-P. A Modification of Sucksmith's Method for the Measurement of Susceptibilities of Para- and Ferromagnetic Materials at Temperatures Between −180° C and 1100° C. W. P. Van Oort. *Journal of Scientific Instruments,* v. 28, Sept. 1951, p. 279-282.

Special attention is paid to the construction of a low and a high-temperature thermostat of such dimensions as to ensure easy handling in a pole gap not wider than 16 mm. (P16)

323-P. Adsorption by Aluminum in the Soft X-Ray Region. D. H. Tomboulian and E. M. Pell. *Physical Review,* ser. 2, v. 83, Sept. 15, 1951, p. 1196-1201.

Measurements on adsorption by Al in the spectral range from 80 to 600 A, using a grazing incidence spectrograph. (P13, A1)

324-P. The Magnetostriction of Single Crystals of Iron-Silicon Alloys. W. J. Carr, Jr., and R. Smoluchowski. *Physical Review,* ser. 2, v. 83, Sept. 15, 1951, p. 1236-1243.

The spontaneous magnetostriction of Fe-Si alloys can be adequately described by two constants, h_1 and h_2. A method is given for calculating the constants accurately from the experimental data. The form effect is calculated and a semi-empirical theory is given for the influence of Si on magnetostriction. (P16, Fe, Si)

325-P. Study of Macroscopic Magnetic Structure. (In French.) Israel Epelboin. *Comtes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, July 30, 1951, p. 358-360.

Study of magnetism in the Rayleigh field permits an interpretation of ferromagnetic behavior in weak alternating fields and of the distribution of permeability in the thickness of sample. Samples of ferronickel were used. (P16, Fe, Ni)

326-P. Method for Determining Surface Tension of Solids. (In French.) Carl Benedicks. *Comtes Rendus hebdomadaires des Seances de l'Academie des Sciences,* v. 233, July 30, 1951, p. 409-410.

Method is based on the "negative wetting" effect for six different samples. This varied between 87 (sugar) and 228 dynes per cm. (annealed steel). These values agree with theoretical predictions. (P10, ST)

327-P. Differential Thermoelectric Force of Thin Layers of Metal. (In German.) E. Justi, M. Kohler, and G. Lautz. *Zeitschrift für Naturforschung,* v. 6a, Aug. 1951, p. 456-462.

For thin vapor-deposited layers of spectroscopically pure Bi, the theoretically expected reduction of the differential thermo-electric force with layer thickness is experimentally proved. Several possible explanations of the phenomenon. (P15, Bi)

328-P. Effect of a Magnetic Field on Crystallization and on the Composition of Solid Solutions. (In German.) Giovanna Mayr. *Zeitschrift für Naturforschung,* v. 6a, Aug. 1951, p. 467.

Discusses experimental results previously published in five different articles. The Co-Cu system, Bi, and Cd are considered.
(P16, M24, Co, Cu, Bi, Cd)

329-P. Low Temperature Heat Capacities of Inorganic Solids. VIII. Heat Capacity of Zirconium From 14 to 3000° K. Gordon B. Skinner and Herrick L. Johnston. **IX. Heat Capacity and Thermodynamic Properties of Cuprous Oxide From 14 to 300° K.** Jih-Keng Hu and Herrick L. Johnston. *Journal of the American Chemical Society,* v. 73, Oct. 1951, p. 4549-4551.

12 references. (P12, Zr)

330-P. The Vapor Pressures of Inorganic Substances. VI. Vanadium Between 1666° K. and 1882° K. James W. Edwards, Herrick L. Johnston, and Paul E. Blackburn. **VII. Iron Between 1356° K. and 1519° K. and Cobalt Between 1363° K. and 1522° K.** James W. Edwards, Herrick L. Johnston, and Walter E. Ditmars. *Journal of the American Chemical Society,* v. 73, Oct. 1951, p. 4727-4732.

Results are charted and tabulated. Apparatus and procedure. 14 ref. (P12, V, Fe, Co)

331-P. The Solubility of Copper in Liquid Lead Below 950°. O. J. Kleppa and J. A. Weil. *Journal of the American Chemical Society,* v. 73, Oct. 1951, p. 4848-4850.

The Pb-rich region of the Cu-Pb phase diagram was studied by a solubility method. The shape of the liquidus curve between 950° C. and the eutectic temperature (326° C.) was determined. From the data obtained, the differential heat of solution (relative partial molal heat content) and the excess (non-ideal) partial molar entropy of mixing were calculated for Cu at very low concentrations in liquid Pb.
(P12, N12, Pb, Cu)

332-P. The Dissociation Pressures of Thorium Dihydride in the Thorium-Thorium Dihydride System. Manley W. Mallett and Ivor E. Campbell. *Journal of the American Chemical Society,* v. 73, Oct. 1951, p. 4850-4852.

Measured for the range of compositions up to approximately $ThH_{1.90}$ at temperatures of 650-875° C. The system resembles the Pd-H system in that the observed dissociation pressures are dependent on the solid-phase composition throughout the system. 11 ref. (P12, Th)

333-P. Corresponding or Homologous Temperatures. Albert M. Portevin. *Metal Progress,* v. 60, Oct. 1951, p. 109-110.

Use of room temperature or the centrigrade scale masks relationships which exist among the properties of metals. Recommends use of "corresponding" or "homologous" scales for each metal, running from zero at absolute zero to 100 at melting point of the given metal. Some useful results of this approach. (P11)

334-P. Resolution of Annealing Experiments for the Study of Non-Equilibrium States. Philip Schwed. *National Advisory Committee for Aeronautics,* Research Memorandum E51G24, Sept. 27, 1951, 15 pages.

Insight into the condition of a solid which is not in the equilibrium state may be obtained by determining the manner in which properties of the solid change as it is annealed. In general, annealing is done either by subjecting the sample to a series of fixed temperatures, or by steadily raising the temperature. In either case, the way in which the property studied changes during annealing makes it possible to distinguish non-equilibrium states of sufficiently different activation energies. A resolving power is defined for each of these two techniques. Equations are derived which can be used to evaluate the merits of an annealing experiment on the basis of these definitions. Treatment is strictly theoretical and mathematical.
(P12, N general)

335-P. A Theory of Conductivity of Cold-Worked Copper. Rolf Landauer. *National Advisory Committee for Aeronautics,* Technical Note 2439, Sept. 1951, 23 pages.

The increase in the resistivity of Cu under cold working is calculated. The increase is assumed to be caused by dislocations surrounded by a long-range electrostatic field that scatters the conduction electrons. From the calculated increment in resistance and the known increase of resistivity of heavily cold-worked copper, the number of dislocations was found to be in agreement with the number estimated on the basis of stored-energy measurements.
(P15, Cu)

336-P. Penetration of Magnetic Fields into Superconductors III. Measurements on Thin Films of Tin, Lead and Indium. J. M. Lock. *Proceedings of the Royal Society,* ser. A, v. 208, Sept. 7, 1951, p. 391-408.

Magnetic moments of thin superconducting films of Sn, Pb, and In, obtained by evaporation of the metal in vacuo, were measured by a

ballistic method. Values of penetration depth at absolute zero, derived from them by extrapolation, are estimated. Within limits of experimental error, the results agree with the penetration law of London & London. 18 ref. (P16, Sn, Pb, In)

337-P. (Book) Aktuelle Forschungs-Probleme aus der Physik Dünner Schichten. (Timely Research Problems in the Physics of Thin Layers.) Herbert Mayer. 142 pages. 1950. R. Oldenbourg, Munich, Germany.

Importance of the thin layer to research and technology, especially in the study of boundary surface and boundary layer effects, of the transitions from atomic molecular layers to the microscopic body and the accompanying change in physical properties and microscopic physical phenomena. Various methods of studying surface roughness; the transition from the individual metal atom to the compact-metal; the Weiss-Heisenberg molecular ranges of ferromagnetic bodies; superconduction of thin layers; principles of the external photo-electric effect on metals; adsorptive layers and coefficient of accommodation. (P10, M general, S15)

338-P. Transformer Iron Losses. N. H. Crowhurst. *Electronic Engineering,* v. 23, Oct. 1951, p. 396-403.

For power transformers it is generally adequate to specify the total loss at the operating frequency and to consider the temperature rise which this loss is likely to produce, according to the type of design employed. In the design of audio-frequency transformers, however, it is necessary to know more about the characteristics of the iron, in order to determine the response which the component will produce in association with the circuits to which it is connected. Charts enable a more complete analysis of the behavior of the iron to be made quite readily for two materials in common use: ordinary grade transformer iron in laminations 0.016 in. thick, and also Mumetal in laminations 0.015 in. thick. (P16, Fe, Ni)

339-P. Electrical Properties of Selenium. II. Microcrystalline Selenium. H. W. Henkels. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1265-1278.

Dependence of electrical properties on history of preparation, i.e., as functions of temperature of initial liquid Se, quench procedure, nucleation procedure, temperature of crystallization, and time of crystallization. Electrical properties of melt single crystals and the microcrystalline matrix were compared. Influence of the nonmetals S, O_2, I_2, in small quantities, on electrical properties. Carrier densities and effective mobilities as functions of temperature of measurement were estimated from data on thermoelectric powers and resistivities. Frequency dependence of resistivity was determined. (P15, Se)

340-P. AC Characteristics of Si p-n Junction. Sakuji Komagata, Mitio Hatoyama, Motoichi Shibuya, Wataru Sasaki, Takaaki Yamamoto, and Makoto Kikuchi. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1290.

Some ingots prepared from silicon, containing small amounts of unknown impurities, were found to be partly of p-type and partly of n-type. Several samples of p-n junctions were cut from these ingots and their characteristics studied. (P15, Si)

341-P. Catalysis by Metal Powders. Donald P. Smith. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1291-1292.

Proposes an explanation which regards the metal powder as strained metal in small masses, and attributes its activity to the same characteristics of widened lattice intervals which are evident in large masses, instead of to special properties of surfaces and adsorbed layers. (P13)

342-P. The Electrical Resistivity of Cold-Worked Copper-Iron Alloys. F. E. Hetherington and James Reekie. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1293-1294.

Measurements were made on a series of alloys of Cu with small amounts of Fe, the alloys being used both in the annealed state and after various degrees of cold working carried out by drawing through dies. Conclusions are drawn regarding behavior of Fe impurity when subjected to stress in the metal. (P15, Cu)

343-P. A Method for Determining the Energy Stored During Cold-Working of Metals. M. B. Bever and L. B. Ticknor. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1297-1298.

New calorimetric method employs the fact that heats of solution are small in some metallic systems, especially compared to heats of solution of metals in aqueous media. Initial work was carried out with Sn as solvent and additions of Ag and Au-Ag alloy in the annealed and cold worked state. (P12)

344-P. Optical Absorption and Photoconductivity of Amorphous and Hexagonal Selenium. M. A. Gilleo. *Journal of Chemical Physics,* v. 19, Oct. 1951, p. 1291-1297.

Dependence of these properties on temperature. Apparatus and results. 36 ref. (P17, Se)

345-P. Experimental Investigation of Forced-Convection Heat-Transfer Characteristics of Lead-Bismuth Eutectic. Bernard Lubarsky. *National Advisory Committee for Aeronautics,* Research Memorandum E51GO2, Sept. 20, 1951, 30 pages.

Data were obtained for heat addition to Pb-Bi flowing in a circular tube and in an annulus with heat extraction from the inner surface. The effect on the heat-transfer characteristics of adding a wetting agent (Mg) was investigated. (P11, Pb, Bi)

346-P. High-Temperature Properties and Characteristics of a Ferritic Steam-Piping Steel. A. W. Rankin and W. A. Reich. *Transactions of the American Society of Mechanical Engineers,* v. 73, Oct. 1951, p. 891-898; disc., p. 898-904.

Previously abstracted from *American Society of Mechanical Engineers,* Paper 50-A-76, 1950. See item 103-P, 1951.

(P general, Q general, AY, SG-h)

347-P. A New Method of Determining Thermal Diffusivity of Solids at Various Temperatures. D. Rosenthal and A. Ambrosio. *Transactions of the American Society of Mechanical Engineers,* v. 73, Oct. 1951, p. 971-974.

The theory of moving heat sources is the basis for the method. A long prismatic bar is heated by a moving point heat source. Temperature-time history at a single point of the bar is determined, using two different heat-source velocities. The method was tried on a commercial "yellow" brass tube. The first equation developed for calculation of thermal diffusivity proved unworkable, hence a second equation based on different assumptions was developed. This equation gave values in the range 100-400° C. reproducible within ± 3%. (P11)

348-P. Path-Length Problems of Electrons in Metals and Semiconductors. (In German.) E. Justi, M. Kohler, and G. Lautz. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 3, 1951, p. 34-43.

In general the electrical resistivity of metal specimens does not depend on their size. At low temperatures, however, the mean free path of the electrons can be comparable with the dimensions of the specimens. Shows that there is a discrepancy between the formulas of K. Fuchs and R. B. Dingles and the experimental results of van den Berg and hitherto unpublished measurements of the author for gold at liquid-helium temperatures. Explains the discrepancy by the increase of residual resistivity with cold working of the surface layer and therefore by enlargement of the effective surface area. Resistivity measurements on cylindrical specimens of Mylius gold, perhaps the purest metal ever obtained, (P15, Au)

349-P. Hall Effect and Electron Configuration of the Noble Metals. (In German.) E. Justi and M. Kohler. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 3, 1951, p. 44-48.

In previous papers the authors reported new precise measurement of Hall coefficients of Cb, Re, Ru, Rh, Ir, and new values for Cu, Ag, Au. These coefficients show a monotonic change from high positive to high negative values with increasing atomic number in each period of the periodic system. These results can be explained satisfactorily in terms of a two-band-model according to Mott. Quantitative evaluation of the measured values gives some results for the different configuration of electrons in the free and the crystalline state of these metals. (P15, M25, EG-a)

350-P. The Behavior of the Thermoelectric Effect at Very Low Temperatures. (In German.) Max Kohler. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 3, 1951, p. 49-54.

The thermo-electric phenomena of electronic conductors are considered using only the three principal laws of thermodynamics. The theory developed explains the hitherto reported discrepancies between the thermodynamic and the electron theoretical treatment of thermo-electric phenomena. (P15)

351-P. Dependence of the Effect of Thermomagnetic Treatment on Initial Properties of Ferromagnetic Materials. (In Russian.) A. A. Lukshin and Ya. S. Shur. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 78, May 11, 1951, p. 243-244.

Since thermomagnetic treatment causes certain changes in crystal lattice, it is theorized that the effect of such treatment depends on initial state of the crystal lattice. The theory was confirmed by experimental work on 66-Permalloy and "Alsifer" (5.5% Al, 9.5% Si, rest Fe). (P16, Ni, Fe, SG-n, p)

352-P. Problem of the Energies of Formation and Phase Transformations of Al-Zn Alloys. (In Russian.) V. S. Lyashenko. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Chemical Sciences, May-June 1951, p. 242-254.

Method of determination during continuous heating in a reducing atmosphere. Heat capacities above the liquidus temperature and heats of

phase transformation were measured for 14 different Al-Zn alloys. Critical points were determined and the Al-Zn constitution diagram plotted. An equation for change of free energy during formation of the alloy from the elements is set up. Experimental data are tabulated and charted. 10 ref.
(P12, N6, M24, Al, Zn)

353-P. Laws Governing Rate of Solution of Metals in Concentrated Acids. I. (In Russian.) Ya. V. Durbin. *Zhurnal Obshchei Khimii* (Journal of General Chemistry), v. 21, (83), May 1951, p. 801-808.

The cause of a maximum on the rate vs. concentration curves for metals in concentrated acids, and lack of connection with the maximum on electroconductivity vs. concentration curves. Solution of Cr in HCl was studied as an example. Reactions at the metal surface at different concentrations were found to be determining factors in rate of solution. 15 ref. (P13)

354-P. Electron Transmission Through Thin Metal Sections With Application to Self-Recovery in Cold Worked Aluminum. R. D. Heidenreich. *Bell System Technical Journal,* v. 30, Oct. 1951, pt. 1, p. 867-887.

An interpretation of electron interference phenomena occurring in thin metal sections particularly as it pertains to structural changes accompanying plastic deformation. New data concerning the effect of temperature on the polygon or domain size in cold worked Al. 11 ref. (P15, Q24, Al)

355-P. On the Reflection of Electrons by Metallic Crystals. L. A. MacColl. *Bell System Technical Journal,* v. 30, Oct. 1951, pt. 1, p. 888-906.

Results of some calculations of the reflection coefficient for electrons incident normally on a plane face of a metallic crystal. The physical situation is treated as being one-dimensional; and it is assumed that the potential energy of an electron is a sinusoidal function of distance inside the crystal, and obeys the classical image force law outside of the crystal. Data are graphed (P15)

356-P. The Use of the Field Emission Electron Microscope in Adsorption Studies of W on W and Ba on W. J. A. Becker. *Bell System Technical Journal,* v. 30, Oct. 1951, p. 907-932.

The technique and its significance for the study of adsorption phenomena basic to thermionic, photoelectric, and secondary emission, also to catalysis and to biological processes. The field-emission microscope tube, also field emission from a paraboloidal surface of a W single crystal, effect of temperature in determining size of 110, 211, and 100 planes, effect of high fields and temperature in determining surface configuration, and effect of temperature in changing an abnormal to a normal pattern. Emission and absorption properties of B on W. Includes numerous field-emission patterns. (P13, W)

357-P. Frequency Dependence of Elastic Constants and Losses in Nickel. R. M. Bozorth, W. P. Mason, and H. J. McSkimin. *Bell System Technical Journal,* v. 30, Oct. 1951, pt. 1, p. 970-989.

The elastic constants of Ni crystals, and their variation with magnetic field (ΔE effect), were measured by a 10-mc. ultransonic pulsing method. The constants of three crystals agree well with one another when the crystals are magnetically saturated, but vary with domain distribution when demagnetized. By measuring the ΔE effect and the decrement of polycrystalline rods at low frequencies, it is shown that the small effect observed at 10 mc. is due to a relaxation in the domain wall motion due to micro eddy-current damping. 13 ref. (P16, Ni)

358-P. The Free Energy Diagram of the Vanadium-Oxygen System. N. P. Allen, O. Kubaschewski, and O. von Goldbeck. *Journal of the Electrochemical Society,* v. 98, Nov. 1951, p. 417-424.

The slope of the energy curve at low concentrations of oxygen was determined by establishing equilibria between vanadium-oxygen solutions and molten barium, magnesium, or calcium. The O_2 contents in V thus obtained were determined by the vacuum-fusion method. With these results the free-energy curve for V-O_2 was completed. The results further suggest that the solubility of O_2 in V is much lower than has been assumed hitherto. 26 ref.
(P12, V)

359-P. Free Energy of Formation of Cementite and the Solubility of Cementite in Austenite. L. S. Darken and R. W. Gurry. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1015-1018.

Solubility of cementite in austenite was computed by thermodynamic methods from observed solubility of graphite. It was found to be greater than that of graphite in the entire austenite temperature range. Thus prior discrepancy between this portion of the phase diagram and the observed metastability of ce-

mentite is partially resolved. 20 ref. (P12, M24, ST)

360-P. Thermodynamic Study of the Reaction $CaS + H_2O \rightleftarrows CaO + H_2S$ and the Desulphurization of Liquid Metals With Lime. *Journal of Metals,* v. 3, Nov. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1047-1048.

Discussion of above paper (by Terkel Rosenqvist). (July 1951 issue, see item 227-P, 1951.) (P12, Cu, Fe)

361-P. Ignition Temperatures of Magnesium and Magnesium Alloys. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1075-1076.

Discussion of above paper (by W. Martin Fassell, Jr., Leonard B. Gulbransen, John R. Lewis, and J. Hugh Hamilton). (July 1951 issue, item 226-P, 1951.) (P12, Mg)

362-P. Influence of Certain Surface-Active Compounds on the Hydrogen Overvoltage of Platinum and Copper. R. D. Misch and R. B. Bernstein. *Journal of Physical & Colloid Chemistry,* v. 55, Nov. 1951, p. 1401-1409.

Further information on the hydrogen-discharge process where various foreign species are present at low concentration in the electrolyte. The linearity of the H_2 overvoltage vs. log current density relationships were verified for Pt and Cu. A rapid recording apparatus is described. (P15, Pt, Cu)

363-P. The Impedance Concept in Thin Film Optics. Paul J. Leurgans. *Journal of the Optical Society of America,* v. 41, Oct. 1951, p. 714-717.

The one-to-one correspondence between transmission line theory and the theory of the optical behavior of thin films is discussed. Advantage is taken of this analogy to apply the methods developed for the solution of transmission-line problems involving transparent dielectric films. A variation of the method is used to derive a new way of obtaining the optical constants of opaque metal films. (P17)

364-P. Optical Constants of Germanium, Silicon, and Pyrite in the Infrared. Ivan Simon. *Journal of the Optical Society of America,* v. 41, Oct. 1951, p. 730.

Possibility of applying the reflection method to the investigation of the optical properties of semiconductors. The method involves measurement of the reflecting power of the plane, polished surface of a bulk sample at two different angles of incidence. The advantage of the method lies in the ease of preparation of samples and its applicability in a wide wavelength interval. (P17, Ge, Si)

365-P. The Electrical Conductivity of Liquid Germanium. Robert W. Keyes. *Physical Review,* ser. 2, v. 84, Oct. 15, 1951, p. 367-368.

The melting of Ge shows a certain analogy to the transition from gray, semiconducting tin to white metallic tin at 13° C. (P15, Ge)

366-P. Ferromagnetism in Heusler's Alloys. Robert R. Heikes. *Physical Review,* ser. 2, v. 84, Oct. 15, 1951, p. 376-377.

Ferromagnetism of the Heusler alloys is usually attributed to the positive exchange interaction of the Mn atoms (Heisenberg's theory). However, the magnetic properties of these alloys can also be explained by Zener's theory of ferromagnetism. Using known data, some semi-quantitative calculations are made for Cu_2MnIn and Cu_2MnAl. (P16, Cu, Mn, In, Al)

367-P. Thermal Conductivity of Superconducting Lead in the Intermediate State. R. T. Webber and D. A. Spohr. *Physical Review,* ser. 2, v. 84, Oct. 15, 1951, p. 384-385.

Data for high-purity Pb are charted and discussed. (P11, Pb)

368-P. Magnetic Phenomenon. Alvin B. Kaufman. *Radio-Electronics,* v. 23, Nov. 1951, p. 41-43.

An unusual phenomenon is the change of resistance of bismuth wire when placed in magnetic fields of different intensities. This change of resistance is as high as 100 to 1. Other electrical and magnetic properties. Present and potential electronics applications. Diagrams and illustrations of equipment for study of these properties. (P17, Bi)

369-P. The Vapor Pressures of Lanthanum and Praseodymium. Adrian Hill Daane. U. S. Atomic Energy Commission, AECD-3209, Dec. 14, 1950, 92 pages.

A technique for preparing rare-earth metals was devised in which their chlorides were reduced by Ca in Ta vessels; the resulting metal was cast in Ta molds to remove volatile impurities. A technique for measuring vapor pressures of materials of low volatility consisted of modifying Knudsen's effusion method by placing a quartz fiber balance inside of the vacuum apparatus to measure weight losses from the effusion vessel. 106 ref. (P12, La, Pr)

370-P. The Variation of the Resistivity of Some Metals With Elastic Deformation. (In English.) M. J. Druybesteyn. *Physica,* v. 17, Aug. 1951, p. 748-760.

Measured on wires and foils. In case of Al, single crystals were prepared and all three crystal constants of the tensor, giving the re-

lation between relative variation of resistivity and deformation, could be determined. In the case of Cu, Ag, and Au, foils with a preferred orientation were used. From the measurements on these foils, anisotropy could not be determined; hence it was not possible to calculate exactly their constants. Product of anisotropy and degree of texture of the foil was determined. (P15, Q21)

371-P. A Possible Explanation of the Increase of the Electrical Resistance of Thin Metal Films at Low Temperatures and Small Field Strengths. (In English.) C. J. Gorter. *Physica,* v. 17, Aug. 1951, p. 777-780.

The film is supposed to consist of separate grains or blocks and the energy required for separation of a positive and a negative charge, located on different grains, is compared with the thermal energy. (P15)

372-P. Structure and Thermomagnetic Properties of Cobalt Carbide, Co_2C. (In French.) J. Drain and A. Michel. *Bulletin de la Societé Chimique de France,* July-Aug. 1951, p. 517-519.

By exposing Co to CO_2 at 210° C., Co_2C was obtained. It is assumed that this results from insertion of C atoms into the orthorhombic lattice of the Co, which produces various solid solutions, of which CoC is the upper limit. The thermal evolution of Co_2C was investigated. (P16, P12, Co, C-n)

373-P. The Solubility of Carbon in Iron. (In French.) Marcel Guédras. *Métallurgie et la Construction mécanique,* v. 83, Sept. 1951, p. 653-654.

Solubility for various temperatures, on the basis of existing information. (P12, Fe)

374-P. Influence of Phosphorus on the Activity of Sulfur in Liquid Iron. (In French.) John Chipman and Charles W. Sherman. *Revue de Metallurgie,* v. 48, Aug. 1951, p. 613-618; disc., p. 618.

Discussed as a problem of a nonmetallic solute in a metallic solvent. Experimental methods and results; activity in ternary and quarternary systems. 11 ref. (P12, Fe)

375-P. Observations on Molten Contact Bridges. III. (In German.) Gerhard Schrag and Rudolf Toberer. *Zeitschrift für Metallkunde,* v. 42, Aug. 1951, p. 243-245.

Tendency of Cu, Ni, and Co to form stationary oxide-containing molten "bridges" with Au at electrical contacts. A very small amount of gold was found to reduce greatly the formation of these bridges. (P15, Cu, Ni, Co)

376-P. Research on the Wetting Effect and on Liquostriction. (In Italian.) Carl Benedicks and Robert Härden. *Metallurgia Italiana,* v. 43, Sept. 1951, p. 383-397.

Previous work proved that resistance to tensile stress of solids is affected by positive or negative "wetting action" of various liquids in contact with the surfaces. Results of further work show that the wetting effect is a function of surface tension of the wetting agent and that tensile strength decreases with increasing hardness of the solid. Theoretical interpretation of these observations. Demonstrates existence of the "liquostriction" phenomenon—expansion of solids caused by contact with liquids. Results obtained with various ferrous and nonferrous metals and alloys are tabulated and charted. 13 ref. (P10, Q23)

377-P. The Surface Tension of Mercury, Melted Tin, Bismuth, Lead, and Some Lead Alloys. (In Polish.) J. Foryst. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 4, 1951, p. 307-327.

Determined by the maximum-bubble-pressure method. Surface tension of mercury, measured against H_2, N_2, and CO_2, depends on time of contact with these gases. Surface tension of molten Sn and Pb is higher against Co_2 than against N_2 and H_2. The complex association of metals cannot be determined by calculating the Eötvös constant on basis of experimental data. Small additions of Zn and Sn do not affect the surface tension of molten Pb. 32 ref.
(P10, Hg, Sn, Pb, Bi)

378-P. Investigation of the Magnetic Properties of Ordered Alloys of the Co-Mn System. (In Russian.) F. Galperin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 21, 1951, p. 1011-1014.

Shows a linear dependence of paramagnetic susceptibility on degree of order and a dependence of mass susceptibility on holding time and temperature, for Co-Mn alloys. Experimental data thus indicate that the variation of magnetic properties of these alloys is induced by the order-disorder transformation. (P16, Co, Mn)

379-P. Physical, Thermal and Electrical Properties of Hafnium and High-Purity Zirconium. H. K. Adenstedt. *American Society for Metals,* Preprint 1W, 1951, 19 pages.

Properties of 99+% Hf and 99.9+% Zr that were determined are melting point, modulus of elasticity, thermo-electric force relative

to platinum between room temperature and approximately 1830° F., electrical resistivity and thermal expansion between —294 and approximately 1830° F., and mean specific heat between 80 and 212° F. Samples were prepared from as-deposited iodide crystal bars, cold swaged rods, cold swaged and annealed rods, annealed sheet, and wire. 26 ref.
(P12, P11, P15, Q21, Hf, Zr)

380-P. The Solubility of Carbon in Molten Iron and in Iron-Silicon and Iron-Manganese Alloys. John Chipman, Robert M. Alfred, Lester W. Gott, Richard B. Small, Duncan M. Wilson, C. Napier Thomson, Donald L. Guernsey, and James C. Fulton. *American Society for Metals,* Preprint 4W, 1951, 16 pages.

A simple experimental method in which molten metal in equilibrium with a graphite container is quenched in a water-cooled Cu mold. Data on the solubility of C in Fe may be expressed as a linear function of temperature between the eutectic and about 2000° C. At higher temperatures, irregularly higher solubilities were observed. The solubility is increased by Mn and diminished by Si. At 21-23% Si, a second solid phase appears. Data are presented for the range 1290-1690° C. for alloys containing up to 20% Si or 70% Mn. 16 ref.
(P12, Si, Mn, Fe)

381-P. High-Temperature Reactions in the System Titanium Carbide-Boron Carbide. Harold M. Greenhouse, Oliver E. Accountius, and Harry H. Sisler. *Journal of the American Chemical Society,* v. 73, Nov. 1951, p. 5086-5087.

TiC and B_4C are shown, above 1920° C., to produce TiB_2, carbon, and a higher boride of Ti of unknown composition.
(P13, C-n, Ti, B, SG-h)

382-P. The Gaseous Species of the Al-Al_2O_3 System. Leo Brewer and Alan W. Searcy. *Journal of the American Chemical Society,* v. 73, Nov. 1951, p. 5308-5314.

Vapor pressures of Al and of Al_2O_3 were both measured by the Knudsen effusion method. Results of these determinations and results from heating of Al-Al_2O_3 mixtures were used in deciding the identity of the important gaseous species of the system. Al_2O gas is evolved when Al_2O_3 is heated with Al or another reducing metal. AlO appears to be the principal Al species when Al_2O_3 is volatilized alone. Thermodynamic constants were determined. 21 ref. (P12, Al)

383-P. (Book) Metallurgical Thermochemistry. O. Kubaschewski and E. Ll. Evans. Butterworth-Springer, Ltd., Bell Yard, Temple Bar, London W.C.2, England. 35s.

A comprehensive review of metallurgical thermodynamics. The first three sections deal with thermodynamics, experimental methods employed in thermochemistry, and estimation of thermochemical data when direct experimental determinations are not available. Fourth section: 100 pages of tables giving detailed thermochemical and thermodynamical data for a large number of elements and compounds, metallic solutions, and metallurgical reactions, with estimated accuracy of all tabulated values of heat capacities and free energies of reaction. Fifth section: Some examples of thermodynamical treatment of metallurgical problems. (P12)

SECTION Q

MECHANICAL PROPERTIES and TEST METHODS; DEFORMATION

1-Q. The Flow and Fracture of Metals. *Welding Journal,* v. 29, Dec. 1950, p. 623s.

A selected bibliography of comprehensive treatises prepared by Materials Division, Pressure Vessel Research Committee, Welding Research Council. 15 ref. (Q24, Q26)

2-Q. Weldcracking and Blue-Brittleness. L. W. C. Gaymans. *Welding Journal,* v. 29, Dec. 1950, p. 623s-624s.

Speculates on mechanism of the above in mild steel and their relationship. (Q23, K9, CN)

3-Q. Effect of Nuclear Radiation on Metal. D. S. Billington and Sidney Siegel. *Metal Progress,* v. 58, Dec. 1950, p. 847-852.

Certain theoretical predictions are checked by experiments on some pure metals and some common alloys, wherein their hardness, modulus of elasticity, and electrical resistance are compared, before and after irradiation. Work was done on Al, Cu, Cu-Au, Cu-Be, stainless steel, Monel, and other materials. An increase in hardness always resulted from considerable exposure. (Q29, Q23, P15)

4-Q. Creep of Copper. *Metal Progress,* v. 58, Dec. 1950, p. 900, 902. Condensed from "Creep of High-Purity Copper", William D. Jenkins and Thomas G. Digges.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 657-Q, 1950. (Q3, Cu)

5-Q. How Can Hardness Values Be Used in Metal Design? John B. Campbell. *Material & Methods,* v. 32, Dec. 1950, p. 43-47.

Limitations of use of hardness data in metals selection and design work. Differences between the various hardness test procedures. General limitations; hardness vs. strength, wear resistance, machinability, and formability. (Q29)

6-Q. Comparison of Fatigue Strengths of Bare and Alclad 24S-T3 Aluminum-Alloy Sheet Specimens Tested at 12 and 1000 Cycles Per Minute. Frank C. Smith, William C. Brueggeman, and Richard H. Harwell. *National Advisory Committee for Aeronautics,* Technical Note 2231, Dec. 1950, 18 pages.

Results of axial fatigue tests conducted on 0.032-in. thick flat sheet specimens to determine the effect of frequency of loading on fatigue strengths. (Q7, A1)

7-Q. Influence of Microstructure on the Hot Strength of Steel. Georges Delbart and Michael Ravery. *Metal Treatment and Drop Forging,* v. 17, Autumn 1950, p. 171-186, 188. Translated.

Previously abstracted from *Revue de Métallurgie* under similar title. See item 361-Q, 1950. (Q3, M27, AY)

8-Q. Influence of the Rate of Loading of the Test Machine on Characteristics of Malleable Cast Iron. (In French.) Jean Gelain. *Fonderie,* Oct. 1950, p. 2205-2208.

Investigated for rates of load application varying from 0.16 to 2.15 kg. per sq. mm. per sec. An Amsler test machine of 10 tons capacity was used. Tabulated and charted data indicate that rate of loading has negligible effect on tensile strength. (Q27, CI)

9-Q. Notes on Transverse Mechanical Properties of Forgings. (In Italian.) Aldo Bartocci. *Metallurgia Italiana,* v. 42, Aug.-Sept. 1950, p. 289-296.

Results of statistical analysis of data on special heat treated steels, including influence of various factors such as dendritic structure, shape of ingots, forging sequence, and process by which the steel was made. (Q general, F22, CN)

10-Q. Influence of Position in the Periodic Table on the Effect of Elementary Additions on the Mechanical Properties of Copper, Silver, and Gold. (In Russian.) B. B. Gulyaev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 21, 1950, p. 1089-1092.

Attempts to develop rules for above influence, as an aid in predicting properties obtainable by adding different elements. Relationships are shown graphically. (Q general, Cu, Ag, Au)

11-Q. The Workability of Steel. (In Czech.) Slavoj Todl. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 85-98.

Results of extensive experimental study of the effects of various factors on workability. Appearance of intercrystalline fractures parallel to the grain boundaries and their relationship to melting and ingot-casting technique and to heat treatment. (Q23, Q24, ST)

12-Q. How Furnace Moisture Causes Embrittlement. C. A. Zapffe. *Iron Age,* v. 166, Dec. 28, 1950, p. 60-65.

See abstract of "Embrittlement of Stainless Steel by Steam in Heat Treating Atmospheres," C. A. Zapffe and R. L. Phebus, *American Society for Metals,* Preprint No. 25, 1950, item 733-Q, 1950. (Q23, J2, SS)

13-Q. Plastic Flow of Platinum Wires. R. P. Carreker, Jr. *Journal of Applied Physics,* v. 21, Dec. 1950, p. 1289-1296.

Strain-time behavior of annealed Pt wires at constant stress and temperature is reported for a wide range of experimental conditions: 78-1550° K., 900-40,000 psi., 0.001-0.1 strain, and 10^{-1} to 10^{-6} min. strain rate. Equations which describe the results satisfactorily. 14 ref. (Q24, Pt)

14-Q. An Approximation Method for the Determination of the Elastic Constants of Cubic Single Crystals. J. R. Neighbours and Charles S. Smith. *Journal of Applied Physics,* v. 21, Dec. 1950, p. 1338-1339.

Calculation procedure. (Q21)

15-Q. Effects of Prior Static and Dynamic Stresses on the Fatigue Strength of Aluminum Alloys. John A. Bennett and James L. Baker. *Journal of Research of the National Bureau of Standards,* v. 45, Dec. 1950, p. 449-457.

Tests on Alclad 24S-T sheet showed that prior static load has a marked effect on fatigue strength in unidirectional bending when the stress amplitude is relatively small. From tests on bare 24S-T sheet, it was found that a few cycles at a stress amplitude of 17,000 psi. resulted in a large increase in the fatigue life at 20,000 psi. Damage tests for other combinations of stress amplitudes indicated that damage was nearly a linear function of ratio of the number of cycles at a given stress to the number that would cause failure at that stress. A new design of specimen and a new form of S-N diagram. (Q7, Al)

16-Q. Problems in the Analysis of Growth and Wear Curves. G. E. P. Box. *Biometrics,* v. 6, Dec. 1950, p. 362-389.

In a number of different fields of application, sets of growth and wear curves must be analyzed. Methods of analysis which have been found useful, what assumptions are being made, and how these assumptions can be tested. Examples from growth of laboratory animals and from wear of coated fabrics and of tire treads. 22 ref. (Q9)

17-Q. Experiments for the Determination of the Influence of Residual Stresses on the Fatigue Strength of Structures. M. Ros. *Welding Research,* v. 4, Oct. 1950. (Bound with *Transactions of the Institute of Welding,* v. 13), p. 83r-93r.

Tests on structural parts into which stresses were introduced in different ways as follows: flat-plate specimens with drilled holes and with fitted or shrunk-in plugs or pressed-in conical dowels; flat specimens machined all over, cross-section 100 by 20 mm., with a bore of 20 mm. diameter in the center of the specimen with and without enlargement hole by pressing; pairs of flat specimens subjected to internal restraint; cold straightened rectangular test pieces originally severely curved; welded-in plugs machined all over, not heat treated; and flat specimens with and without single weld beads deposited on one of the edges of the specimen. Conclusions. (Q25, Q7)

18-Q. Cold Work; Effect on Certain Properties of Steel. J. H. Andrew, H. Lee, and others. **Sec. II. Effect of Cold Work Upon Electrical Resistivity in Steel.** J. H. Andrews, H. Lee, P. L. Chang, and R. Guenot. **Sec. III. An X-Ray Investigation of Internal Stresses in Cold-Drawn Steel.** J. H. Andrew and P. E. Brooks. **Sec. IV. Effect of High-Speed Deformation on Steel.** J. H. Andrew and L. Bourne. **Sec. V. An X-Ray Investigation of Structural Changes in Steel Due to Cold-Working.** D. V. Wilson. **Sec. VI. Effect of Cold-Work on Hydrogen in**

Steel. J. H. Andrew, U. V. Bhat, and H. K. Lloyd. **Sec. VII. General Discussion.** *Iron and Steel,* v. 23, Nov. 28, 1950, p. 438-455; disc., p. 471-472.

See abstracts from *Journal of the Iron and Steel Institute,* items 460-Q and 629-Q, 1950.
(Q23, Q24, Q25, P15, ST)

19-Q. Fatigue Properties of Helical Springs for I. C. Engine Valve Springs and Other Duties. B. M. Pearson. *Wire Industry,* v. 17, Dec. 1950, p. 987-989.

Reviews recent German and American articles covering tests on nonalloyed helical springs at room temperature, on alloyed helical valve springs at room temperature, on alloyed and unalloyed springs at moderately elevated temperatures, and on fatigue strength of helical springs of various ferrous materials and finishes and at elevated temperatures. (Q7, T7, CN, AY)

20-Q. Fatigue-Bending Strength and Wear Resistance of Gear Wheels. (In German.) Heinz Glaubitz. *Archiv für technisches Messen,* Nov. 1950, p. T126 (2 p.)

Several methods for determining the mechanical properties of gear teeth. Wear resistance is determined by "running tests", subjecting the gears being tested to increasing loads. Special equipment is used to measure wear due to gear shifting. 12 ref. (Q9, Q7)

21-Q. Experimental Determination of the Difference Between Isothermal and Adiabatic Values of Young's Modulus for Aluminum. (In Italian.) I. Barducci. *Alluminio,* v. 19, No. 5, 1950, p. 416-418.

Indirect method based on measurements of internal elastic-energy losses, which according to the Zener theory depend solely on the difference of the indicated isothermal and adiabatic values. (Q23, Al)

22-Q. New Methods for Testing Antifriction Alloys. (In Russian.) *Vestnik Akademii Nauk SSSR* (News of the Academy of Sciences of the USSR), Sept. 1950, p. 107-109.

Summarizes the work of Khrushchov in developing methods and apparatus to test the properties of new low-tin or tin-free bearing alloys to replace high-Sn babbitt in automobile and tractor bearings. A general theory of antifriction properties is developed. (Q9, SG-c)

23-Q. Deformability of Magnesium Alloys. (In Russian.) S. I. Gubkin and M. I. Zatulovskii. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Oct. 1950, p. 1537-1549.

Experimental investigation on alloys containing 3.60% Al, 0.50% Zn, 0.20% Mn, balance Mg; and 6.50% Al, 1.00% Zn, 0.20% Mn, balance Mg demonstrated that repeated preliminary hot working consisting of upsetting on a press to a degree of deformation not lower than 0.7 considerably increases index of plasticity and temperature range of deformation. Optimum temperature conditions for such hot working. A deformability diagram.
(Q23, G1, Mg)

24-Q. Impact, Tensile and Hardness Tests of Some Ferrous Alloys, Including the Welded Parts, at Low Temperatures. (In English.) Tadao Fukuroi, Gohei Monna, Naomichi Ishii, and Yasuo Okamatsu. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Aug. 1949, p. 101-105.

Previously abstracted from condensed version in *Engineers' Digest.* See item 717-Q, 1950.
(Q27, Q29, Q6, AY, CN)

25-Q. On the Discontinuous Elongation of Aluminium Crystal. (1) (In English.) Tomoyoshi Kawada. *Journal of Mechanical Laboratory,* v. 4, Mar. 1950 (Special No.), p. 26-31.

Experimental apparatus and procedure. Discontinuity in the elongation curve is believed to be due to presence of impurities. (Q23, Al)

26-Q. Study on Wear Phenomena of Steel Against Soil. I. (In Japanese.) Tetsutaro Mitsuhashi, Yutaka Imai, and Shin Yokoi. *Journal of Mechanical Laboratory,* v. 4, May 1950, p. 91-96.

Work done to aid in improvement of agricultural and earth-moving machinery. A new apparatus designed for this research. Certain conclusions are summarized.
(Q9, T3, T4, ST)

27-Q. High-Stress Fatigue of Alloy Steels. T. T. Oberg and W. J. Trapp. *Product Engineering,* v. 22, Jan. 1951, p. 159, 161, 163.

Recent tests were made to determine the fatigue strength of three aircraft steels by means of reversed bending and axial loading. Rate of loading was varied between 90 and 3450 cycles per min. Results of these tests are shown graphically. The steels were SAE 2330, 4340, and 8630. (Q7, AY)

28-Q. On Thermal Stresses, Strains, and Warping. F. H. Murray and G. Young. *U. S. Atomic Energy Commission,* AECD-2960, May 17, 1944, 7 pages.

A mathematical analysis. (Q25)

29-Q. The Effect of Boron on Cast Iron. *Canadian Metals,* v. 13, Dec. 1950, p. 26, 28. Based on "Effect of Boron

on the Structure and Some Physical Properties of Plain Cast Irons", Alexander I. Krynitsky and Harry Stern.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See items 3B-139 and 3B-67, 1949. (Q general, M27, CI)

30-Q. Portable Hardness Tester for Gears. *Machinery* (London), v. 77, Dec. 21, 1950, p. 676-677.

Apparatus which gives Vickers hardness data on large gears, where use of the standard test equipment is impossible. (Q29)

31-Q. Piston Assemblies for Road Transport Oil Engines. J. L. Hepworth. *Institution of Mechanical Engineers, Proceedings* (Automobile Division), pt. 2, 1949-50, p. 69-76; disc., p. 76-87.

The usual types of piston failures such as breakage, seizure, ring sticking, land breakage, land scuffing, and groove destruction, and means for their avoidance. Examination of rates of wear of various components leads to the conclusion that the top compression ring is the weakest point. Service-test results with different piston-ring materials, and suggestions for improved materials. Cr-plated rings gave the best results. Recommendation for use of 12% Si alloy and for an adequate path for heat flow from the piston crown to the ring zone. (Q9, S21, CI, Cr, AY)

32-Q. Some Factors Governing the Performance of Crankcase Lubricating Oils. A. Towle. *Institution of Mechanical Engineers, Proceedings* (Automobile Division), pt. 2, 1949-50, p. 88-98; disc., 98-111.

In addition to basic requirements of a crankcase oil deals with engine wear and bearing failures. (Q9, SG-c)

33-Q. The Phenomenon of Wear; A Practical Device for Testing Abrasion. N. G. Neuweiler. *Microtechnic,* (English Edition.) v. 4, Sept.-Oct. 1950, p. 283-287. (Translated from the German.)

The phenomena of friction; effective contact surface; surface temperature of sliding bodies; polishing of solids; coefficient of friction; and wear. (To be continued.) (Q9)

34-Q. Variation of Microhardness of Monocrystals With Orientation of the Pyramidal Indenter. (In French.) Henri Roth-Meyer. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Oct. 30, 1950, p. 906-908.

Investigated using a Vickers indenter on 99.99% Al and 99.97% Zn crystals. Concludes that the pyramidal indenter is more sensitive than a conical or a spherical indenter. How it may be used to determine variation in hardness due to anisotropy from shape of the imprint, and to determine orientation of crystal faces from slip lines. (Q29, M23, Al, Zn)

35-Q. Influence of Chemical Composition on Strength Properties of Structural Steels. (In Italian.) Raffaello Zoia. *Metallurgia Italiana,* v. 42, Oct. 1950, p. 357-361.

A formula previously established for relationship of tensile strength and chemical composition of structural steels, for tempering temperatures up to 600° C., was extended to higher temperatures and shows that each element has an individual effect, without reciprocal action, on tensile strength. For equal carbon contents, the curves for different amounts of other elements are parallel to each other. (Q23, CN)

36-Q. Formula for Calculation of Tensile Strength as a Function of Carbon and Manganese Content; and a Nomogram for Its Graphical Calculation. (In Italian.) Aurelio Palazzi. *Metallurgia Italiana,* v. 42, Oct. 1950, p. 361-365.

While many formulas are given in the literature, their specific applicability is often in doubt. A method by which a formula suitable for any particular case can be determined, including its limits of error. This method is illustrated by an example in which C and Mn contents of steel are the variables. However, the method may be readily extended to other cases. 20 ref. (Q27, ST)

37-Q. Research on the Effects of Nickel Additions to Cast Tin and Lead-Tin Bronzes. (In German.) A. H. F. Goederitz. *Metall,* v. 4, Dec. 1950, p. 495-498.

Mechanical properties and microstructures of these bearing metals were studied and compared with those of Mn-Si bronze. Results show increased hardness and elongation as well as improved bearing properties. (Q general, M27, Cu, SG-c)

38-Q. Effect of Superheating on the Fatigue-Bending Strength of Aluminum-Copper-Magnesium Alloys. (In German). P. Brenner. *Metall,* v. 4, Dec. 1950, p. 502-504.

Experiments with two Al-Cu-Mg alloys (about 95% Al) showed that superheating reduced their static as well as dynamic strength properties. Photomicrographs show effects on structures. (Q7, Q5, Al)

39-Q. Stress Distribution in Notched Impact Specimens. (In German.) Alfred Krisch. *Archiv für das Eisenhüt-*

tenwesen, v. 21, Nov.-Dec. 1950, p. 403-411.

Experiments were made with two carbon steel and one soft iron impact specimens to study the three-dimensional stress conditions which more or less prevent plastic deformation and thus result in fracture. Methods of determining plastic deformations and of calculating stresses at the bottom of the notch, and effects of specimen width on tendency to fracture. 19 ref. (Q6, Q25, ST, Fe)

40-Q. Correlations Between Stress Gradients and Deformation. Part I. Retarding Plastic Deformation. (In German.) Franz Bollenrath and Alex Troost. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 431-436.

Shows, by theoretical analysis, the invalidity of Kick's law of similarity in certain cases; for instance when in multicrystalline metals with nonuniform stress distribution of stress and deformation, one part of the cross section exceeds the limit of elasticity. 10 ref. (Q25)

41-Q. Strength of Tooth Roots of Straight Toothed Steel Spur Gears. (In German.) G. Niemann and H. Glaubitz. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Nov. 21, 1950, p. 923-932.

Results of mechanical testing and photo-elastic stress analyses showing the effects of tooth shape, material, core hardness and other factors. (Q25, T7)

42-Q. Periodicity of the Influence of Additions on the Mechanical Properties of Metals. (In Russian.) B. B. Gulyaev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Nov. 1, 1950, p. 25-28.

Attempts to correlate position in the periodic table with influence of elementary additions on mechanical properties of Mg, Zn, Cd, Al, Sn, Pb, Fe, Ni, Pd, and Pt. Only binary alloys in the annealed condition were considered. 15 ref. (Q general)

43-Q. Relationship of Creep of Austenitic Alloys to Their Phase Diagrams. (In Russian.) A. M. Borzdyka. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Nov. 1, 1950, p. 37-38.

Investigated for 12 binary and 34 ternary alloys of the Fe-Cr-Ni system at 600 and 700° C. Particular emphasis was placed on the γ solid-solution region. Results are plotted on the phase diagram of the system. (Q3, M24, Fe, Cr, Ni)

44-Q. Plastic Deformation of Electropolished Brass Surfaces. (In Czech.) Ferd Kralik and C. Ivo Zadny. *Hutnicke Listy,* v. 5, Oct. 1950, p. 412-414.

Plastic deformation was studied for α and $\alpha+\beta$ brasses. Photomicrographs illustrate results obtained. (Q24, Cu)

45-Q. (Book) **The Friction and Lubrication of Solids.** F. P. Bowden and D. Tabor. 337 pages. Oxford University Press, Amen House, Warwick Square, London E.C.4, England. 35s.

Investigations conducted into the physical processes, and into some of the chemical processes, that occur during the sliding of solids, also into the mechanism of friction and boundary lubrication. Chapters deal with the action of bearing alloys and the mechanism of metallic friction. (Q9)

46-Q. Operational Stresses in Automotive Gears. Earle Buckingham. *SAE Quarterly Transactions,* v. 5, Jan. 1951, p. 43-55, disc., p. 55.

Previously abstracted from condensed version in *SAE Journal.* See item 749-Q, 1950. (Q25, ST)

47-Q. Measurement of Surface Wear. H. Meincke. *Engineers' Digest,* v. 11, Dec. 1950, p. 417-419. (Translated and condensed.)

Previously abstracted under similar title from *Metalloberfläche.* See item 813-Q, 1950. (Q9)

48-Q. Nomenclature Used for Designating Properties of Materials. R. Alden Webster. *Welding Journal,* v. 30, Jan. 1951, p. 25.

So-called mechanical and physical properties are discussed in an attempt to clarify and to arrive at definitive statements. The distinction between the two groups of properties is quite different than that used in classifying abstracts for *Metals Review.* (Q general, P general)

49-Q. The Work of the Plasticity Committee of the Welding Research Council. *Welding Journal,* v. 30, Jan. 1951, p. 39s-41s.

Activities of the past year have consisted mainly in developing plans for possible research. (Q23)

50-Q. Relative Strain-Aging Tendency of Weld and Base Metal. R. W. Fountain and R. D. Stout. *Welding Journal,* v. 30, Jan. 1951, p. 43s-46s.

An investigation of the relative tendency of the weld-metal heat-affected zone and base metal to change ductility after straining and aging. Semikilled steel plate with 0.18% + C, ¾ in. thick, was used throughout the investigation. (Q23, J27, CN)

51-Q. A Notch-Bend Test. Carl A. Zapffe and Clee O. Worden. *Welding Journal,* v. 30, Jan. 1951, p. 47s-54s.

Development of a notched-bar bend test and its applicability to mild, chromium, and stainless steel. (Q5, CN, AY, SS)

52-Q. Evaluating Carbon Plate Steels by the Keyhole Charpy Impact Test. R. W. Vanderbeck. *Welding Journal,* v. 30, Jan. 1951, p. 59s-64s.

Application of keyhole-Charpy behavior to interpretation of impact results for a number of carbon steels shows how transition temperature is affected by composition, deoxidation practice, and plate thickness. (Q6, CN)

53-Q. Residual Stresses in Machined Surfaces. E. K. Henriksen. *Transactions of the American Society of Mechanical Engineers,* v. 73, Jan. 1951, p. 69-76.

The stress-inducing effect of single-point tools on steels with varying carbon content was studied. Methods for computing the stresses induced were developed. Highly concentrated stresses (up to 100,000 psi.) are produced. In ductile materials, such as carbon steel, the stresses are, generally, tensile; in cast iron they are compressive. Methods of investigation, and data for stresses produced in various materials, by various tools, and under various cutting conditions. Possible detrimental effects of these stresses. 18 ref. (Q25, G17)

54-Q. Safety Margins and Stress Levels in High-Temperature Equipment. Ernest L. Robinson. *Transactions of the American Society of Mechanical Engineers,* v. 73, Jan. 1951, p. 89-95, disc., p. 95-99.

Factors of safety and working-stress levels currently in use in high-temperature equipment, and their relationship to physical properties at high temperature, as determined by the various tests currently in use. Differences between various industrial applications are pointed out in comparison with rules at present used by General Electric Co. 21 ref. (Q25, SG-h)

55-Q. The Nature of Friction; The Phenomena of Wear and Boundary Lubrication. H. Brian Locke. *Metal Industry,* v. 77, Dec. 22, 1950, p. 303-305; Dec. 29, 1950, p. 323-324.

A general discussion, including the fact that, under normal conditions, a "dirt" film soon forms on all surfaces, including those of bearings, and acts as a boundary lubricant. 25 ref. (Q9)

56-Q. Long or Short Test-Pieces? H. Jungbluth. *Foundry Trade Journal,* v. 89, Dec. 28, 1950, p. 559-562. Translated from *Stahl und Eisen.*

Previously abstracted from original. See item 756-Q, 1950. (Q27, CI)

57-Q. Comparison of Mechanical Properties of Rolled Steel With and Without Annealing. (In French.) R. Edelbloude. *Revue de Métallurgie,* v. 47, Nov. 1950, p. 842-855; disc., p. 855.

Investigation performed on 11 different types of steels: low-carbon, medium-carbon, low-alloy, Cr-Ni, Ni-Cr-Mo, and Cr steels. Comprehensive data are tabulated. (Q general, J23, ST)

58-Q. Discussion of Paper by H. de Leiris, "Bursting of Containers Under Pressure." (In French.) *Revue de Métallurgie,* v. 47, Nov. 1950, p. 863-868.

Extensive separate discussions of above paper (Jan. 1950 issue; see item 240-Q, 1950.) by Portevin, Hérenguel, and Crussard. Includes three photomicrographs showing failure and deformation structures of an Al-Zn alloy. (Q23)

59-Q. Hardness and Wear. (In German.) Wilhelm Spath. *Metalloberfläche,* sec. A, v. 4, Dec. 1950, p. 177-180.

Experimental results on the relationship of hardness of wear resistant surfaces (ferrous) and of tensile strength to wear resistance. 11 ref. (Q9, Q29, ST)

60-Q. Opinions on the Study of Materials and Experiences with Machinery, Structures, and Buildings in Switzerland. (In Dutch.) M. Ros. *Metalen,* v. 5, Dec. 1950, p. 74-107.

Testing of structural parts for static and fatigue stresses as well as for stability, especially as applied to the above. Includes numerous diagrams, graphs, photoelastic stress patterns, micrographs, macrographs. 21 ref. (Q23, Q7, Q24)

61-Q. Research on the Strength Properties of Metals at Low Temperatures. (In German.) Karl Wellinger and Willi Seufert. *Zeitschrift für Metallkunde,* v. 41, Oct. 1950, p. 317-321.

Pressure vs. deformation curves obtained at room temperature and at −180° C. for a variety of metals. Results help to explain the brittleness of ferrous metals and of Mg and the toughness of certain nonferrous metals at low temperatures. Effects of low-temperature compression on hardness. 26 ref. (Q23)

62-Q. Strength Properties of Metals at Low Temperatures. (In German.) Albert Kochendorfer. *Zeitschrift für Metallkunde,* v. 41, Oct. 1950, p. 322-325.

Shows that computed temperature

effects on yield point agree almost perfectly with Wellinger and Seufert's experimentally determined results. Explains the effects of temperature on different metals as well as the observation that the cubic face-centered metals have a "memory" for preliminary deformations at low temperatures, while the cubic body-centered metals do not have this "memory". (Q23, Q24)

63-Q. Influencing Factors in Determining Fatigue Strength From the Static Yield Point. (In German.) Alfred Schaal. *Zeitschrift für Metallkunde,* v. 41, Oct. 1950, p. 334-339.

Comparison of experimentally established fatigue strengths and yield points of 18 different carbon and alloy steels indicates a positive correlation between these properties. Surface deformation caused by normal machining has an insignificant effect on fatigue strength, but the latter is greatly reduced when average grain size is less than 10^{-4} cm. and when the metal has previously been severely deformed plastically over its entire cross-section. Foreign inclusions and brittle alloying elements may have a similar effect. 14 ref. (Q7, CN, AY)

64-Q. Production of Zones of High Wear Resistance on Pieces of Material. (In German.) Hermann Meincke. *Zeitschrift für Metallkunde,* v. 41, Oct. 1950, p. 344-346.

Preliminary experiments with mono and polycrystals were made to determine the crystal face of greatest scratch hardness and, hence, of greatest wear resistance. Conclusions were tested on a cast Al-Cu alloy (4% Cu) and a Cr-Ni steel. (Q9, Q29, Al, AY)

65-Q. The Fatigue Strength of Porous Sand-Cast Gamma-Silumin Parts. (In German.) Hans Reininger. *Zeitschrift für Metallkunde,* v. 41, Oct. 1950, p. 348-357.

Reviews the literature on the fatigue strength of γ-phase silumin and shows that a moderate amount of porosity does not necessarily reduce the fatigue strength of the alloy enough to warrant its rejection. The effects, classifications, and quantitative determination of porosity and its effect on fatigue strength. 16 ref. (Q7, Al)

66-Q. Relationship Between Criteria for the Second Stage of Relaxation and Creep of Austenitic Steel. (In Russian.) I. A. Oding. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Nov. 11, 1950, p. 197-200.

Derives a formula for this relationship on the basis of R. W. Bailey's hypothesis (1926) that creep consists of a process in which strength increases and decreases alternately. Comparison of data obtained by use of this formula on four different types of austenitic steels (Cr-Ni-Co steels with additions of Mo, W, and Ti) with those of experimental investigation showed good agreement. (Q3, AY, SS)

67-Q. Effect of Columbium Additions on the Creep Strength of Heat Resistant Chromium-Nickel Steel. (In Russian.) A. M. Borzdyka. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Nov. 11, 1950, p. 213-214.

Experimentally investigated for six types of 14-14 Cr-Ni steel with W contents of 2.1-2.4%. Two of the steels were low-carbon (0.12-0.13% C). Analysis of tabulated data indicates that addition of 0.7-1.2% Cb increases creep strength of the low-carbon steel 1.5-2.0 times. It appears that creep strength of such steels depends largely on Cb:C ratio, the optimum ratio being about 10. (Q3, SS)

68-Q. Interpretation of Tension Creep-Time Relations. Joseph Marin and L. W. Hu. *ASTM Bulletin,* Jan. 1951, p. 57-59.

Proposes a creep-stress relation for creep of metals at elevated temperatures which is simple to use and at the same time gives a good fit to the test data. (Q3)

69-Q. An Evaluation of the Effective Gage-Length Equivalent of the Fillet and Shoulder of the Gage Length Portion of a Tension Test Bar Under Creep and Stress-Rupture Conditions. H. V. Kinsey. *ASTM Bulletin,* Jan. 1951, p. 60-62.

Errors introduced into creep measurements when the over-all test specimen is included in the extensometer system. Three high-temperature alloys were used as examples. Shows that it is not possible to arrive at a common correction factor for equivalent gage length, even for one alloy, if true effective gage length is to be determined within limits of ±1%, unless a specimen having an 8-in. gage length is employed. (Q3, Q4)

70-Q. Friction. Frederic Palmer. *Scientific American,* v. 184, Feb. 1951, p. 54-58.

Fundamental causes of friction and the different theories which have been advanced, but not entirely reconciled. (Q9)

71-Q. Checks Hardness on-the-Job. *Iron Age,* v. 167, Feb. 1, 1951, p. 116.

Readings of metal hardness may

now be taken any place in a plant or warehouse in a matter of seconds. It is done with a 30-oz., palm-sized hardness tester, made by Snow, Deakin and Co., Ltd., England. The device has been used to measure the hardness of flat, curved, round, and other shapes. Sheet metal as thin as 0.020 in. has also been successfully tested. (Q29)

72-Q. A Structural-Efficiency Evaluation of Titanium at Normal and Elevated Temperatures. George J. Heimerl and Paul F. Barrett. *National Advisory Committee for Aeronautics,* Technical Note 2269, Jan. 1951, 16 pages.

Includes comparisons with several other materials. Methods of evaluation, based upon use of stress-strain curves and structural indexes, for compressive loading without buckling, for column buckling, and for the buckling of long plates in compression or shear. 14 ref. (Q28, Q2, Ti, SG-h)

73-Q. Testing Machine for Combined Tension and Torsion. H. V. Pollard and H. J. Tapsell. *Engineering,* v. 171, Jan. 12, 1951, p. 58-59.

Apparatus at National Physical Laboratory in Britain has a capacity of 2400 lb. in tension and 1200 lb-in. in torsion. (Q27, Q1)

74-Q. Discussion on the Paper: "Plastic Strain and Hysteresis in Drawn Steel Wire," by R. S. Brown. *Journal of the Iron and Steel Institute,* v. 166, Dec. 1950, p. 319-320.

Covers above paper published in June 1949 issue (see item 19B-117, 1949). Includes author's reply. (Q23, F28, ST)

75-Q. Recent Developments in Hardness Testing. (In German.) Von P. Grodzinski. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, Nov. 1950, p. 335-340.

A new static-penetration and a new grinding-type hardness tester, both designed for testing very hard materials (including diamonds). (Q29)

76-Q. The Importance of the Effect of Susceptibility to Failure of Structural Steels for Large Structures on Their Weldability. (In German.) Walter Grosse. *Stahl und Eisen,* v. 70, Dec. 21, 1950, p. 1193-1204.

Shows that tensile and bending tests fail to measure adequately the strength properties of steels subject to three-dimensional stresses. Test methods proposed in Germany and in the U. S. Factors affecting the brittle-fracture susceptibility of different types of welded steel. 39 ref. (Q23, K9, CN)

77-Q. Effect of Increased Silicon and Manganese Content on the Properties of 10 and 14-Ton Heavy Forged Ingots of Openhearth Steel. (In German.) Wilhelm Meisemeyer. *Stahl und Eisen,* v. 71, Jan. 4, 1951, p. 8-15; disc., p. 15.

Effects of Si and Mn above normal amounts on primary crystallization, structure, and mechanical properties of forged steels. 30 ref. (Q general, M27, CN)

78-Q. Mechanical and Physical Properties of Pure Al and Several Al Alloys at the Temperature of Liquid Oxygen. (In German.) H. Mader. *Metall,* v. 5, Jan. 1951, p. 1-5.

Static tensile strengths, impact strengths, and shock resistances of welded and unwelded 99.5% Al sheets and of several Al alloys were determined at 20 and −183° C. Thermal expansion coefficients and specific heats were also determined. Test apparatus and procedure. (Q27, Q6, P11, Al)

79-Q. Investigation of Mechanical Properties of Steel Resulting From Temperatures Similar to Those Produced During Welding. (In Russian.) N. N. Prokhorov and S. A. Kurkin. *Avtogennoe Delo* (Welding), v. 21, Oct. 1950, p. 6-10.

The probability of formation of hot tears during welding occurs at temperatures near the solidus line. Steels with a large temperature range of restoration of plasticity were found to be more liable to form hot tears, and steels which reduce their intercrystalline strength slowly during cooling of the weld are more subject to the influence of variations in welding conditions. Experimental data for different types of steel. Method of investigation. (Q23, K9, ST)

80-Q. Concerning the Type of Wear Which Takes Place Under Conditions of Dry Friction. (In Russian.) I. V. Kragelskii and E. M. Shvetsova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Dec. 11, 1950, p. 681-683.

Investigated for binary combinations of W, Mo, Ta, Ni, Fe, Ca, Al, Pb, Bi, and Sn. Three types of interaction of surfaces were observed, reciprocal attraction of molecular fields, molecular adhesion of adjacent surfaces, and reciprocal intrusion of parts of the surfaces in contact. During sliding contact, these types of interaction result in different types of damage. (Q9)

81-Q. Experiments on Use of the Electron Microscope for Measurement of Particularly Small Impressions Obtained During Microhardness Tests.

(In Russian.) M. M. Khrushchev and E. S. Berkovich. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Nov. 1950, p. 1645-1647.

Possibility of measuring dimensions of impressions made by 3 or 4-sided pyramidal indenters, even when size of the impressions is less than one micron. A replica is first made of the impression. This is then viewed in the electron microscope. Results obtained for synthetic ruby are illustrated. (Q29, M21)

82-Q. The Research of G. V. Uzhik in the Fields of Strength and Plasticity. (In Russian.) L. A. Glikman, N. N. Davidenkov, S. V. Serensen, Ya. B. Fridman, N. A. Shaposhmikov, N. P. Shchapov, and Ya. I. Yagn. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Nov. 1950, p. 1709-1715.

Analyzes theoretical bases of Uzhik's work on determination of tear resistance and indicates fallacies in his assumptions. Also attempts to show that Uzhik's theories of strength and plasticity are unfounded. 23 ref. (Q23)

83-Q. Further Remarks Concerning Resistance to Tear as a New Criterion of Mechanical Strength. (In Russian.) G. V. Uzhik. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Nov. 1950, p. 1716-1746.

Replies to the criticisms of Glikman and others. (See above abstract.) Extensive arguments and theoretical and experimental verification of his theories. 18 ref. (Q23)

84-Q. On the Effect of the Difference in Heat Treatments on the Yielding of a Carbon Steel. (In English.) Tomiya Sutoki and Kisuke Saito. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Oct. 1949, p. 143-147.

Results of experiments.
(Q23, J general, CN)

85-Q. The Variation of Young's Modulus of a Binary Body-Centered Alloy Caused by the Formation of Superlattice. (In English.) Yoshio Shibuya. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Oct. 1949, p. 161-168.

Theoretical, mathematical analysis. Compares results with those of experiment. 14 ref. (Q21, N10)

86-Q. On the Internal Stress and the Internal Friction of Metals. I. On the Mechanism of Fatigue. II. The Change of the Internal Friction of Ni_3Fe During the Formation of Superlattice. (In English.) Hiroshi Sato. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Oct. 1949, p. 203-211.

Experimental apparatus and procedure. Results obtained. In Part I, carbon steels, Al and Al alloys were studied. (Q22, Q7, CN, Al, Ni, Fe)

87-Q. On Flattening Test of Steel Cylinder. (In English.) Ryozi Aida. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Oct. 1949, p. 255-259.

Standard "flattening" test used on steel compressed-gas cylinders. The cylinder is rejected if cracks are formed under stipulated conditions. Results of extensive investigation of this test. Composition of steel is not given. (Q5, ST)

88-Q. Contribution to the Study of Hardness and Work-Hardening Capacity of Metals. (In Spanish.) Jose Terraza Martorell. *Instituto del Hierro y del Acero,* v. 3, Apr.-June 1950, p. 132-149.

Different methods for determination of work hardening capacity of metals, in particular those based on Meyer's law. Proposes a method for Meyer's constant determination and its use in establishing "limit of plasticity" and "elastic hardness." Experimental investigation proved applicability of theoretical method. 40 ref. (Q29)

89-Q. Microhardness Tester for Metals at Elevated Temperatures. Abner Brenner. *Journal of Research of the National Bureau of Standards,* v. 46, Feb. 1951, p. 126-131.

Apparatus devised for measuring the hardness of electrodeposited coatings at temperatures up to 900° C. in an inert atmosphere. Coatings thicker than about 0.07 mm. may be tested. Some typical measurements are given. (Q29)

90-Q. High Stress Fatigue of Aluminum and Magnesium Alloys. T. T. Oberg and W. J. Trapp. *Product Engineering,* v. 22, Feb. 1951, p. 159, 161, 163.

Series of graphs show variation of these properties with number of cycles for several Al and Mg alloys. (Q7, Al, Mg)

91-Q. Section Thickness in Meehanite Castings; Its Influence on Selection for Uniform Properties. C. R. Austin. *Machine Design,* v. 23, Feb. 1951, p. 130-131.

Mechanical properties of the different types of Meehanite cast iron are tabulated. Charts show effect of section thickness on tensile strength for each type. Three cross sections with hardness values indicated show degree of uniformity of this property in as-cast material.
(Q23, Q29, CI)

92-Q. Summary of the Work of the Ship Structure Committee. K. K. Cowart. *Welding Journal,* v. 30, Feb. 1951, p. 65s-67s.

Work of the committee on the problem of failures in welded ships. Anticipated benefits of the research. (Q23, K9, T22, CN)

93-Q. Stress Studies of Welded Ship Structure Specimens. Wm. R. Campbell. *Welding Journal,* v. 30, Feb. 1951, p. 68s-76s; disc., p. 76s-78s.

Four ship specimens were tested in the Engineering Mechanics Section of the National Bureau of Standards for the Ship Structure Committee. The tests are part of a study of typical structural discontinuities in ships to determine the magnitude of stress concentrations and areas affected by discontinuities, and to furnish data necessary for improving current designs. Elastic stress distribution at room temperature, strain distribution prior to failure at 0° F., and energy to fracture at 0° F. Each specimen represents the intersection of a bottom longitudinal and a transverse bulkhead found in welded-tanker design. (Q25, T22, CN)

94-Q. Reports of International Welding Commissions. *Welding Journal,* v. 30, Feb. 1951, p. 78s, 90s, 104s.

"Residual Stresses and Stress Relieving," by R. Weck; and "Brittle Fractures," by A. Goelzer; presented June 5-10, 1950, in Paris. Apparently refers only to steels. (Q25, Q23, J1, ST)

95-Q. Some Metallurgical Aspects of Ship Steel Quality. H. M. Banta, R. H. Frazier, and C. H. Lorig. *Welding Journal,* v. 30, Feb. 1951, p. 79s-89s; disc., 89s-90s.

Semikilled 200-lb. laboratory heats can be made with ample reproducibility for use in studying the influence of chemical composition and deoxidation upon the transition-temperature characteristics of ABS class A and B plate-steels. Effect on transition temperature of C, P, V, S, Si, and Mn. (Q23, T22, CN)

96-Q. The Determination of Initial Stresses and Results of Tests on Steel Plates. Part I. The General Problem and Evaluation of the Method Used. E. W. Suppiger. **Part II. The Method of the Hole.** C. Riparbelli. **Part III. Experimental Techniques and Test Results.** Edward R. Ward. *Welding Journal,* v. 30, Feb. 1951, p. 91s-104s.

A nondestructive method for determining initial stresses. Strain-gage measurements are made in the vicinity of ⅛-in. holes. Complete details of mathematics involved in analysis of the data. Theory, test results, and recommended procedures. (Q25, CN)

97-Q. Time-Measurements Using the Joergensen-Weibel System. J. H. P. Koot. *Engineers' Digest,* v. 12, Jan. 1951, p. 24-26. (Translated and condensed from *Ingenieur,* v. 62, Oct. 27, 1950, p. O39-O43.)

The Joergensen-Weibel electronic chronograph was first used for determination of the velocity of artillery projectiles. It is now being employed to investigate the mechanical properties of materials, by determining the velocity of propagation of longitudinal sound waves in elastic materials, and correlating the value obtained for sonic velocity with strength and type of structure of the material considered. Includes circuit diagrams. (Q23, P10)

98-Q. The Design and Fabrication of Welded Structures Subjected to Repeated Loading. Part V (continued) **and Part VI.** R. Weck. *Welder,* v. 19, July-Sept. 1950, p. 61-70.

Fatigue strength of riveted joints and effect of single beads of weld metal on fatigue strength of plate steel. Values for fatigue strength of various types of butt welds obtained by different investigators. Effect of flaws revealed by radiographs on fatigue strength show that no clear relationship exists. (To be continued.) (Q7, K general, CN)

99-Q. Hydrogen Embrittlement of SAE 1020 Steel. J. B. Seabrook, N. J. Grant, and Dennis Carney. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 139-150; disc., p. 150-152.

Previously abstracted from *Journal of Metals.* See item 789-Q, 1950. (Q23, CN)

100-Q. Vanadium-Treated, Non-Aging, Rimming Steel for Deep-Drawing Quality Sheet. S. Epstein, H. J. Cutler, and J. W. Frame. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 153-160; disc., p. 160-161.

Previously abstracted from *Journal of Metals.* See item 408-Q, 1950. (Q general, G4, ST)

101-Q. Improved Test Bars for Standard and Ductile Grades of Cast Iron. Richard A. Flinn and R. Wayne Kraft. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 153-167; disc., p. 167-168.

Previously abstracted from preprint. See item 311-Q, 1950. (Q27, CI)

102-Q. Fatigue Data Summary. M. E. Annich. *Transactions of the Amer-*

ican Foundrymen's Society, v. 58, 1950, p. 169-172; disc., p. 172-173.
(Q7)

103-Q. Section Size Relationships in Nodular Iron. G. Vennerholm, H. Bogart, and R. Melmoth. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 174-183; disc., p. 183-184.

Influence of Mg residuals on mechanical properties of high-strength and high-ductility nodular iron. A microstructural analysis with numerous graphs and micrographs.
(Q general, M27, CI)

104-Q. Composition and Properties of Gray Iron. Parts I and II. Richard Schneidewind and R. G. McElwee. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 312-330; disc., p. 330-332.

Previously abstracted from preprint. See item 313-Q, 1950.
(Q23, E11, CI)

105-Q. Some Tests on Relaxation of Cast Iron. V. T. Malcolm and S. Low. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 456-458; disc., p. 458-459.

Previously abstracted from preprint. See item 312-Q, 1950.
(Q25, CI)

106-Q. Steel Quality as Related to Test Bar Fractures. H. H. Johnson and G. A. Fisher. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 537-548; disc., p. 548-549.

Previously abstracted from preprint. See item 314-Q, 1950.
(Q26, CI)

107-Q. Dilatometer Studies of Nodular Cast Iron. N. A. Ziegler, W. L. Meinhart, and J. R. Goldsmith. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 637-648; disc., p. 648-649.

Previously abstracted from preprint. See item 315-Q, 1950.
(Q23, P11, CI)

108-Q. Waterproofing Electrical-Resistance Strain Gauges. J. D. Todd. *Engineering,* v. 171, Jan. 19, 1951, p. 67.

Method developed for concrete work in which the gage is completely encased in brass foil. The method should be applicable to other fields of work. (Q25, T1)

109-Q. The Deformation of Copper and Iron Crystals by Unidirectional Abrasion. D. M. Evans, D. N. Layton, and H. Wilman. *Proceedings of the Royal Society,* ser. A, v. 205, Jan. 22, 1951, p. 17-30.

In order to test the theory that a new deformation process, rotational slip, occurs prominently when crystal surfaces are abraded unidirectionally, an approximately (110) face of a Cu crystal was smoothed by electropolishing, abraded, and examined by electron diffraction after various stages of etching. In iron, also, large rotation of parts of the crystal surface occurred when crystals were abraded parallel to either (100), (110), or (111) planes which were normal or steeply inclined to the surface. Interpretation in terms of rotational slip is fully supported by previous metallographic observations on Cu, Al, and Fe and by electron-diffraction evidence of the structure of beaten metal foils. 33 ref.
(Q24, M26, Cu, Fe)

110-Q. The Stresses and Strains in a Partly Plastic Thick Tube Under Internal Pressure and End-Load. D. N. de G. Allen, and D. G. Sopwith. *Proceedings of the Royal Society,* ser. A, v. 205, Jan. 22, 1951, p. 69-83.

Many solutions have been proposed for the stress distribution in a thick tube subjected to an internal pressure sufficient to cause yield at the interior, usually in connection with autofrettage of gun barrels. These all give the same values for radial and circumferential stresses, but differ in axial stresses. Reviews these solutions and presents an analysis making fewer assumptions; this is developed into a form suitable for practical application. (Q25, U7)

111-Q. (Book) **Twelve Lectures on Theoretical Rheology.** Ed. 2. Markus Reiner. 162 pages. 1949. Interscience Publishers Inc., 215 Fourth Ave., New York 3, N. Y.

An introduction to that branch of physics which deals with the deformation and flow of materials. Seven-page bibliography. (Q24)

112-Q. Effects of Prior Stress on the Fatigue of Aluminum Alloys. *Technical News Bulletin* (National Bureau of Standards), v. 35, Feb. 1951, p. 19-20.

See abstract of complete version under similar title from *Journal of Research of the National Bureau of Standards,* item 15-Q, 1951.
(Q7, Al)

113-Q. Comparative Strength of Some Adhesive-Adherend Systems. N. J. DeLollis, Nancy Rücker, and J. E. Wier. *Transactions of the American Society of Mechanical Engineers,* v. 73, Feb. 1951, p. 183-193.

One phase of an investigation of the nature of adhesion. The adhesives were polyvinyl acetate, cellulose nitrate, resorcinol resin, casein, gum arabic, natural rubber, and neoprene. The adherends were stainless steel, an Al alloy, paper-phenolic laminate, glass, birchwood, and hard

rubber. Properties studied were double-lap shear, tensile, long-time loading shear, and impact strengths. 17 ref.
(Q27, Q2, Q6, K12, SS, Al)

114-Q. On the Theory of Plastic Deformation. Doris Kuhlmann. *Proceedings of the Physical Society,* v. 64, sec. A, Feb. 1, 1951, p. 140-155.

A model for plastic deformation in soft metals is based on the assumption that in real crystals there is always a number of regions present which, by an unknown process, act as sources of dislocations. It is also assumed that in soft metals dislocations are very mobile except in a limited number of regions which act as obstacles. The model is applied to explain a number of facts connected with plastic deformation. 56 ref. (Q24)

115-Q. Factors Controlling Dislocation Widths. A. J. Foreman, M. A. Jaswon, and J. K. Wood. *Proceedings of the Physical Society,* v. 64, sec. A, Feb. 1, 1951, p. 156-163.

The work of Peierls and Nabarro is extended to a family of edge dislocations of greater widths. The theory is applied to bubble-raft dislocations, and satisfactory agreement found with experiment. 10 ref. (Q24)

116-Q. Measurement of Stresses in 115 RE Rail on Tangent Track—North Western Railway. *American Railway Engineering Association Bulletin,* v. 52, Feb. 1951, p. 690-704.

Part of "Report on Assignment 11: Recent Developments Affecting Rail Section," from Report of Committee 4 on Rail. Measured stresses are correlated with laboratory fatigue data. (Q25, Q7, CN)

117-Q. Determining the Relative Wear Resistance of Metals. I. F. Reed and E. D. Gordon. *Agricultural Engineering,* v. 32, Feb. 1951, p. 98-100.

Wear-test machine developed by the U. S. Dept. of Agriculture in which relative wear resistance of metals and alloys to a flow of sand past a moving disk is determined. Results are used to indicate suitability of the metals for soil-tillage tools of various types. 19 ref.
(Q9, T3)

118-Q. Effect of Nuclear Radiation on Metals. J. T. Richards. *Metal Progress,* v. 59, Feb. 1951, p. 249.

Commenting on article of above title by D. S. Billington and Sidney Siegel (Dec. 1950 issue), the author proposes an alternative explanation for the increased hardness and resistivity noted after irradiation of beryllium-copper. (Q29, P15, Cu)

119-Q. Creep of Pure Zinc. *Metal Progress,* v. 59, Feb. 1951, p. 290, 294. (Condensed from "The Flow of Zinc Under Constant Stress", A. H. Cottrell and V. Aytekin.)

Previously abstracted from *Journal of the Institute of Metals.* See item 664-Q, 1950. (Q24, Q3, Zn)

120-Q. A Three-Dimensional Photoelastic Stress Analysis of a Threaded Drill Pipe Joint. William F. Franz. *Petroleum Engineer,* v. 23, Feb. 1951, p. B60-B62, B64-B65.

Details of methods used and results. (Q25)

121-Q. The Application of Various Hardness Testing Methods for Metallic Materials. *Industrial Diamond Review,* new ser., v. 11, Jan. 1951, p. 13-15. (Translated and condensed from "Draft DIN Standard", June 1950, Materialprüfungsamt, Berlin-Dahlem, Germany.)

Comparative survey of various hardness testing methods. (Q29)

122-Q. A Mechanical Determination of Biaxial Residual Stress in Sheet Materials. R. G. Treuting and W. T. Read, Jr. *Journal of Applied Physics,* v. 22, Feb. 1951, p. 130-134.

A method for determining residual stress in sheet material by removing successive uniform layers of material from the surface and measuring the resulting curvature. From condition of equilibrium of a free specimen, a stress vs. curvature relation is derived which applies when stress is constant in the plane of the specimen and varies with thickness. A practical example. (Q25)

123-Q. Dry Metallic Friction as a Function of Temperature Between 4.2° K. and 600° K. I. Simon, H. O. McMahon, and R. J. Bowen. *Journal of Applied Physics,* v. 22, Feb. 1951, p. 177-184.

Coefficients of static friction of six metals (Fe, Ni, Cu, Pb, Sn, and Zn) were measured in above range. Shear strengths and hardnesses were measured over the same range. Their ratio is in most cases dependent to only a slight extent on temperature. This fact tends to substantiate the adhesion theory of friction proposed by Bowden. 10 ref.
(Q9, Fe, Ni, Cu, Pb, Sn, Zn)

124-Q. Causes and Prevention of Drill Collar Failure. Stanley C. Moore. *Drilling Contractor,* v. 7, Feb. 15, 1951, p. 60-63.

Design, stress, and corrosion factors and their influence on failures. (Q25, R general, ST)

125-Q. Plasticity. James B. Kelley. *Physics Today,* v. 4, Mar. 1951, p. 17-23.

Traces progress in understanding of plastic flow as a major problem

for the structural designer and the physicist alike. Includes fractographs showing typical structural patterns of different metals resulting from plastic flow. (Q23)

126-Q. Elastic Properties. W. Köster. "The American FIAT Review of German Science. Vol. 31. General Metallurgy," 1950, p. 55-63.

Influence of temperature, concentration, mechanical and thermal treatment, and ferromagnetic state on modulus of elasticity. Measurements on monocrystals and determination of modulus of elasticity. 26 ref. (Q21)

127-Q. Materials Testing. E. Siebel, N. Ludwig, H. Nowotny, O. Vaupel, and H. Schallbroch. "The American FIAT Review of German Science. Vol. 31. General Metallurgy," 1950, p. 232-344.

Strength characteristics of metals in testing and construction, methods and equipment for strength analysis, wear due to cavitation, nondestructive testing of materials, and cutting and machining tests. 603 ref. (Q general, S13, G17)

128-Q. Utilization of Low Alloy Materials for High Temperature Service Applications. James Miller, L. W. Smith, and Phillip K. Porter. *U. S. Air Force, Air Material Command, Wright-Patterson Air Force Base,* Technical Report 5929, June 1949, 59 pages.

Reports on project to evaluate the high-temperature load-carrying abilities of low-alloy and stainless steels and to determine the feasibility of their use for applications involving exposure to high temperatures for relatively short periods of time. Effect of heat treatment on high-temperature properties was studied for improving short-time strengths. (Q general, AY, SS, SG-h)

129-Q. Static and Fatigue Strengths of High-Strength Aluminum-Alloy Bolted Joints. E. C. Hartmann, Marshall Holt, and I. D. Eaton. *National Advisory Committee for Aeronautics,* Technical Note 2276, Feb. 1951, 61 pages.

Tests were made on several types of joints in 75S-T6, 24S-T4, and 14S-T6 high-strength Al-alloy extruded bar. In order to evaluate sensitivity to effects of a notch consisting of two open holes, a monobloc specimen was tested under a mean load of 16,000 lb. (Q27, Q7, Al)

130-Q. Bearing Strengths of Some Aluminum-Alloy Permanent-Mold Castings. E. M. Finley. *National Advisory Committee for Aeronautics,* Technical Note 2312, Feb. 1951, 15 pages.

Bearing tests were made to determine bearing ultimate and yield strengths of permanent-mold castings of B195-T4, B195-T6, and 356-T6, and to compare the ratios of bearing to tensile properties obtained from sand castings of like material. (Q27, Al)

131-Q. Minor Uses of the Light Metals. II. Titanium in Cast Iron. *Light Metals,* v. 14, Feb. 1951, p. 89-91.

Effects on mechanical properties and corrosion resistance. (Q general, R general, Ti, CI)

132-Q. Correspondence on the Paper: "Tessellated Stresses. Part V," by F. Laszlo. *Journal of the Iron and Steel Institute,* v. 167, Jan. 1951, p. 28-30.

M. L. V. Galer and E. Orowan briefly discuss above paper (Jan. 1950 issue; item 93-Q, 1950.). Dr. Laszlo replies at some length. (Q25, N7)

133-Q. Creep Properties of Some Aluminium Alloys at Temperatures up to 300° C. J. McKeown and R. D. S. Lushey. *Metallurgia,* v. 43, Jan. 1951, p. 15-19.

The materials tested included three wrought and seven cast alloys. Although there are appreciable differences at 100° C., as the temperature is raised, the differences in creep resistance decrease. The order of superiority is not the same throughout the entire temperature range. (Q3, Al)

134-Q. Cumulative Damage in Fatigue; Notes on Information Available From Literature. K. W. Mitchell. *Metallurgia,* v. 43, Jan. 1951, p. 25-28.

In normal fatigue testing, a particular form of load cycle, with simple or combined stresses, is repeated until the specimen breaks. There are, however, occasional applications of stress much higher than normal. While the effects of under-stressing and over-stressing have been investigated, there appears to be no generally accepted manner of formulating a laboratory test which will evaluate the ability of a material to withstand random fluctuations of stress. 16 ref. (Q7)

135-Q. Tensile Properties of Mild Steel Weld Metal at High Temperatures. J. G. Ball and K. Winterton. *Welding Research,* v. 4, Dec. 1950 (bound with *Transactions of the Institute of Welding,* v. 13, Dec. 1950), p. 104r-124r.

Apparatus used to determine tensile properties up to 1425° C. Between 900 and 1100° C., all the mild-steel weld metals tested were found to have low ductility compared with

values at higher and lower temperatures. As loss of ductility was more pronounced in specimens cut transverse to the welding direction, and also as ductility could be improved by annealing, it is probable that the effect is due to segregation. Mild-steel weld metal tested at 1200-1425° C. was found to have high ductility. Includes percentage and composition of oxide inclusions in three samples, also electron-microscope examination of weld-metal structures. 11 ref. (Q27, M27, CN)

136-Q. Ductility of Mild Steel Welds Near the Solidus. E. C. Rollason. *Welding Research,* v. 4, Dec. 1950, (bound with *Transactions of the Institute of Welding,* v. 13, Dec. 1950), p. 125r-128r.

Results of some simple hot-tensile tests on core wire and weld metal show a lowering of ductility at 1250-1280° C. Welds graded according to this criterion are in correct order as regards hot-cracking during welding. Increase of Mn in one type of electrode was shown to maintain hot ductility to a higher temperature. (Q27, K1, CN)

137-Q. An Explanation of Hot-Cracking of Mild Steel Welds. E. C. Rollason. *Welding Research,* v. 4, Dec. 1950 (bound with *Transactions of the Institute of Welding,* v. 13, Dec. 1950), p. 129r-132r.

Explains the above on the basis of a major effect of S and Mn modified by minor influences of P, Si, C, and Ni. Includes macrographs. (Q26, K1, CN)

138-Q. Contribution to the Study of Creep in Boron Steels. (In French.) Georges Delbart and Michel Ravery. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Dec. 18, 1950, p. 1498-1500.

Presence of a small amount of boron in steel causes, in certain cases, formation of precipitates on the grain boundaries despite the fact that boron causes an increase in grain size. Steels containing boron and manifesting grain-boundary precipitation have lower creep resistance in the range 450-550° C. than steels of the same composition except for the boron. (Q3, N7, AY)

139-Q. Distribution of Plastic Deformation in an Iron Tensile-Test Specimen Displaying the Piobert-Luders Phenomenon. (In French.) Michel Mouflard and Paul Lacombe. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Dec. 18, 1950, p. 1500-1502.

Results of investigation of phenomena commonly known as "Luder's lines." (Q24, Fe)

140-Q. Influence of Microstructure and Chemical Composition on the Creep Strength of Chromium-Molybdenum Steels. (In French.) Georges Delbart and Michel Ravery. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Jan. 3, 1951, p. 67-69.

Comparative investigation of three steels (0.12-0.53% C, 0.6-2.0% Cr, 0.44-0.60% Mo) at 450, 500, and 575° C. Results indicate that crystal structure of specimens of the same composition, dependent on testing temperature, often has more influence on creep strength than does composition. (Q3, M26, AY)

141-Q. Elements of the Internal Mechanics of Metals. (In French.) Paul Coron. *Bulletin du Cercle d'Etudes des Métaux,* v. 5, Mar. 1950, p. 285-312.

Theoretical analysis. Equations are developed to express some of the fundamental relationships which exist. They are interpreted for different values of the variables. (To be continued.) (Q25)

142-Q. Suggestion for Proper Evaluation of the Material and Operating Temperatures of Pipelines and Flanges. S. Schwaigerer. *Brennstoff-Wärme-Kraft,* v. 3, Jan. 1951, p. 12-13.

Brief discussion of steel composition, operating temperatures, and mechanical properties of steels, required for selection of proper pipeline materials and calculation of permissible pressures. (Q general)

143-Q. Possible Improvements in the Usual Photo-Elastic Stress Apparatus. (In Italian.) W. Ruff. *Alluminio,* v. 19, no. 6, 1950, p. 523-536.

Several improvements in the Winkler-Zeiss instrument. Comparative results. 18 ref. (Q25)

144-Q. Specific Resistance of Metals to Repeated (Noncontact) Compression. (In Russian.) E. A. Chudakov and G. V. Uzhik. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), new ser., v. 76, Jan. 1, 1951, p. 37-40.

Proves experimentally that, for machine parts subjected to repeated tensile and compressive stresses, the optimum part shape is not the most symmetrical one. In medium-carbon (0.45%) steel, for example, fatigue strength under compression is much higher than under tension. Apparatus and procedure. Data for plain and notched specimens. (Q28, CN)

145-Q. Low-Cost Hardness Tester is Rugged. *Iron Age,* v. 167, Mar. 15, 1951, p. 116.

Simple apparatus developed by F. W. Sowa and W. C. Truckenmiller, University of Michigan, satisfactorily meets the six requirements without the obvious limitations of the

"file test." It is based on the principle of elastic rebound. (Q29)

146-Q. Further Developments in the Burning of Boiler Fuels in Marine Diesel Engines. John Lamb. *Journal of the American Society of Naval Engineers,* v. 63, Feb. 1951, p. 201-251. (Reprinted from *Transactions of the Institute of Marine Engineers,* v. 60, June 1950).

Results obtained in service for various ships. Performance; engine design; wear and corrosion of parts; cylinder-liner and piston-ring materials; lubrication, purification of fuel required for satisfactory operation; and causes of carbon formation on fuel-valve nozzles. Use in 2-cycle engines and need for preheating of fuels. (Q9, R7, CI, ST)

147-Q. Direct Explosion Test to Evaluate Load-Carrying Capacity of Welded Steel Structures. G. S. Mikhalapov. *ASTM Bulletin,* Feb. 1951, p. 53-64.

Test consists essentially in applying a high-velocity blow normal to, and at the center of, a flat, square plate supported along its four edges. Typical results. (Q6, CN)

148-Q. A Mechanical Wear Test Using Fission Fragments. David H. Frisch and Jules S. Levin. *ASTM Bulletin,* Feb. 1951, p. 64-65.

A "hot patch" of surface radioactivity is applied locally to a surface by placing an enriched fission foil near the surface and irradiating the fissionable material with neutrons from a source surrounded by a moderator such as paraffin, water, or oil. The method is adapted to measuring wear depths of from a few millionths to a few ten-thousandths of an inch of dense materials, and up to a mil of lighter materials such as plastics. (Q9, S19)

149-Q. Fatigue Tests of Beams in Flexure. *Welding Journal,* v. 30, Mar. 1951, p. 105s-115s.

Results of fatigue tests on various types of steel beams similar to those used in actual structures and subjected to repeated load cycles. The tests were conducted by W. M. Wilson of the University of Illinois. (Q7, CN)

150-Q. Higher Design Stresses for Pressure Vessels. Perry R. Cassidy. *Welding Journal,* v. 30, Mar. 1951, p. 123s-124s.

Effect of stress concentration in alloy steel pressure vessels under conditions of multiaxial stress and for numbers of cycles of stress less than 100,000. (Q25, T26, AY)

151-Q. Stress Distribution in Plastic Range in a Rigid Frame. L. E. Grinter, Charles Peller, and John Butkus. *Welding Journal,* v. 30, Mar. 1951, p. 125s-134s.

Action of a continuous frame welded for full strength of the material under the influence of a few repeated loads carried well beyond the elastic limit. (Q25)

152-Q. Stress Relieving and Fracture Strength. D. Swan, A. R. Lytle, and C. R. McKinsey. *Welding Journal,* v. 30, Mar. 1951, p. 135s-145s.

Factors of straining and heating involved in application of the controlled low-temperature stress-relieving process were investigated by studying their effect on transition temperature of A-201 steel. It was concluded that there is no appreciable metallurgical effect accompanying this process. Amount of plastic deformation occurring during a destructive test, as measured by amount of strain hardening which takes place at initiation of fracture, was shown to be dependent upon severity of testing conditions. (Q25, J1, CN)

153-Q. Spherical Shells Subjected to Internal Pressure and Low Temperatures. J. L. Walmsley. *Welding Journal,* v. 30, Mar. 1951, p. 153s-167s.

Spherical shell tests were designed to study the behavior of a typical pressure-vessel steel under conditions of biaxial tensile stress combined with subnormal temperatures. Includes thoeretical, mathematical analysis of the results. 13 ref. (Q27, T26, CN)

154-Q. The Micro-Mechanism of Fracture in the Tension Impact Test. *Welding Journal,* v. 30, Mar. 1951, p. 168s.

W. B. Brooks discusses above paper by W. H. Bruckner (Sept. 1950 issue; item 649-Q, 1950). Includes author's reply. (Q27, ST, Fe)

155-Q. Impact Tests Help Engineers Specify Steel. *SAE Journal,* v. 59, Mar. 1951, p. 24-28. (Based on papers given at a meeting of the SAE Iron and Steel Technical Committee's Div. XXIV, on "Low-Temperature Properties of Ferrous Materials," by L. D. Jaffe, P. R. Kosting, A. F. Jones, J. I. Bluhm, A. Hurlich, and J. F. Wallace).

Method developed at Watertown Arsenal laboratory whereby the notched-bar impact test may be used quantitatively for specification of steel for service under shock loading or at low temperatures. Use is made of the concept of an "equivalent Charpy temperature," which is the temperature at which a V-notched Charpy impact-test specimen has fracture behavior similar to that of a given part loaded in

its usual service fashion at the lowest anticipated service temperature. (Q6, ST)

156-Q. Fatigue Failures Are Tensile Failures. J. O. Almen. *Product Engineering*, v. 22, Mar. 1951, p. 101-124.

Case histories in which unexpected and unrecognized improvement in fatigue strength of metal products was obtained from processes applied for other purposes. Re-interpretation of old test data in terms of residual stresses indicates that superior fatigue strength can result from fracture barriers established by beneficial residual stresses induced by fabrication operations or produced by prestressing processes. 17 ref. (Q7, Q25)

157-Q. Mechanical Properties of Metals. H. W. Gillett. *Machine Design*, v. 23, Mar. 1951, p. 143-148, 198, 200. (Based on a chapter of forthcoming book "The Behavior of Engineering Metals.")

How properties are measured and their significance. Emphasizes deviations often encountered between test results and service behavior. (Q general)

158-Q. Fractographic Pattern for 475° C. Embrittlement in Stainless Steel. Carl A. Zapffe. *Journal of Metals*, v. 3, Mar. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 247-248.

Three fractographs illustrate the patterns produced by rifle fire at 100 and 475° C., in Type 446 stainless steel. Transgranular fracture typical of both embrittled and non-embrittled metal is observed below 475° C. Above this temperature, slip begins to play a part. Possible mechanisms. (Q23, M27, SS)

159-Q. Deformation and Recrystallization Texture of Cold-Drawn OFHC Copper Wire. W. A. Backofen. *Journal of Metals*, v. 3, Mar. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 250.

Illustrated by X-ray photograms. (Q24, Cu)

160-Q. Mercury Switch Permits Use of Unlimited Number of Electric Strain Gages. Stuart R. Daniels and U. Seiden. *Civil Engineering*, v. 21, Mar. 1951, p. 48. (Q25)

161-Q. Tensile-Fracturing Characteristics of Several High-Temperature Alloys as Influenced by Orientation in Respect to Forging Direction. W. F. Brown, Jr., H. Schwartzbart, and M. H. Jones. *National Advisory Committee for Aeronautics*, Research Memorandum E50L28, Feb. 12, 1951, 32 pages.

Effects of specimen-axis orientation with respect to forging direction on the true stress-strain curves and the fracturing characteristics at room temperature of forged and subsequently heat treated billets of the alloys 16-25-6, S-816, and Inconel X. 13 ref. (Q27, Q24, SG-h)

162-Q. Some Properties of Beryllium Oxide and Beryllium Oxide-Columbium Ceramals. C. F. Robards and J. J. Gangler. *National Advisory Committee for Aeronautics*, Research Memorandum E50G21, Mar. 2, 1951, 18 pages.

Short-time tensile strength at 1800° F. and relative thermal shock resistance from 1800 and 2000° F. to room temperature were investigated. Effect of additions of 2, 5, 8, 10, 12, and 15% Cb by weight on the thermal shock resistance of BeO. Metallographic examination indicated that the metallic phase coalesces into pockets. Includes graphs, micrographs, and X-ray diffraction patterns. (Q27, M27)

163-Q. Static Indentation Hardness With Indenters Indicating Direction. H. Meincke. *Industrial Diamond Review*, new ser., v. 11, Feb. 1951, p. 37-41; disc. p. 41-42.

Tensile-strength tests give different values according to the direction of rolling, drawing, or pressing, whereas some hardness testing methods give values independent of direction. With indenters indicating direction, i.e. edges or chisels, hardness values in conformity with tensile strength were obtained. (Q29)

164-Q. A Calculation of the Elastic Constants of Aluminum. R. S. Leigh. *Philosophical Magazine*, ser. 7, v. 42, Feb. 1951, p. 139-155.

Elastic constants, which correspond to pure shear without change of volume, are calculated; and the fact that Al crystals are almost elastically isotropic is explained. Nature of the density of states near the Fermi surface, and the way in which the elastic constants may be expected to depend on electron concentration in Al solid solutions. (Q21, P10, Al)

165-Q. Effect of Internal Stresses on the Behavior of Members in the Plastic Range. J. F. Baker and M. R. Horne. *Engineering*, v. 171, Feb. 23, 1951, p. 212-213.

Results of experimental investigation and theoretical analysis. Includes graphs and diagrams showing behavior of steel beams. (Q25, CN)

166-Q. A Survey of the Development of Creep-Resisting Alloys. N. P. Allen. *Engineering*, v. 171, Feb. 23, 1951, p. 235-238. (A condensation.)

Includes tables giving composi-

tions of several creep resisting alloys developed in Britain, the U. S., and Germany. (Q3, SG-h)

167-Q. The Development of Low-Carbon N-155 Alloy for Gas-Turbine Construction. W. O. Binder. *Journal of the Iron and Steel Institute,* v. 167, Feb. 1951, p. 121-134.

Early development of the alloy, and the influence of hot cold working, solution annealing, and precipitation hardening on structure, room-temperature strength, ductility, and impact resistance. Properties at elevated temperatures, and creep curves for various stresses at 650, 730, and 815° C. Amount of scatter in stress-rupture test results is investigated and statistically examined. 29 ref. (Q3, Q4, J27, T25, SG-h)

168-Q. Some Phenomena Associated With the Work-Hardening and Tempering of Steels. P. E. Brookes. *Metal Treatment and Drop Forging,* v. 18, Feb. 1951, p. 75-85.

X-ray back-reflection techniques were used to investigate residual stresses in cold drawn steels. The stresses are shown to vary with carbon content. Effect of tampering on such stresses and suggestions to explain the phenomena observed. 13 ref. (Q25, J29, ST)

169-Q. Some Factors Affecting Microhardness Values. B. B. Hundy. *Metallurgia,* v. 43, Feb. 1951, p. 99-102.

Correlates work of Bergsman and of Bischof and Wenderott with that of the author. (Q29)

170-Q. The Tensile Properties of Heat-Treated Aluminium-Copper and Aluminium-Copper-Cadmium Alloys of Commercial Purity. H. K. Hardy. *Journal of the Institute of Metals,* v. 78, Feb. 1951, p. 657-666.

Al-Cu-Cd alloys of normal purity were examined in the cast or wrought condition. Alloys with more than 0.1% Cd were hot short and generally failed to forge. The quantity of Cd was not critical in the case of cast alloys, and up to 0.5% had no detrimental effect on the ductility of fully heat treated test bars at room temperature. Cd additions increased the strength properties of artificially aged Al-Cu alloys, and slightly improved resistance to salt-spray corrosion. The effect of Cd was not influenced by the presence of Fe, Si, Mn, Zn, Ni, or 0.05% Mg. (Q27, R11, Al)

171-Q. The Fatigue Strength of Metallic Materials Under Alternating Stresses of Varying Amplitude. (In English.) Toshio Nishihara and Toshiro Yamada. *Japan Science Review,* v. 1, Sept. 1950, p. 1-6.

Theoretical calculation of the number of stress cycles required to produce failure. Three fatigue-testing machines and their use to test mild steel, "hard steel", and duralumin. Good agreement with theory was obtained. (Q7, CN, ST, Al)

172-Q. A New Theory Concerning the Yielding of Materials Based on Riemannian Geometry. (In English.) Kazuo Kondo. *Japan Science Review,* v. 1, Sept. 1950, p. 7-10.

(Q23)

173-Q. Research on the Plasticity in Chain Links. (In English.) Kazuo Hamano. *Japan Science Review,* v. 1, Sept. 1950, p. 17-22.

Results of experiments on cast steel stud chain links, using both tensile-test bars and chain-link sets of different sizes, also six cast steel compositions and 3 heat treatments. 10 ref. (Q23, T7, CN)

174-Q. (Book) **Statistics and Strength of Materials.** Jasper O. Draffin and W. Leighton Collins. 398 pages. Ronald Press Co., 15 E. 26th St., New York. $6.50.

An elementary text. The strength-of-materials portion covers simple structural elements involving direct stress, welded connections, torsion, bending, and column action. Data are presented for the more modern materials, such as light-weight alloys, high-strength steel, and plastics. Resistance of materials to energy, creep, repeated loading, and stress concentrations is covered briefly. General principles and their application are stressed. (Q general)

175-Q. A Method of Numerical Analysis of Plastic Flow in Plane Strain and Its Application to the Compression of Ductile Material Between Rough Plates. R. Hill, E. H. Lee, and S. J. Tupper. *Journal of Applied Mechanics,* v. 18. *(Transactions of the American Society of Mechanical Engineers,* v. 73), Mar. 1951, p. 46-52.

(Q24).

176-Q. Evaluation of Stress Distribution in the Symmetrical Neck of Flat Tensile Bars. Julius Aronofsky. *Journal of Applied Mechanics,* v. 18 *(Transactions of the American Society of Mechanical Engineers,* v. 73), Mar. 1951, p. 75-84.

Local strains and strain distribution in the necks of two flat tensile specimens of steel were measured. A strain hardening function for the material was obtained from results of tension tests on round bars. This strain hardening function and measured strains are used to determine stress distribution in the neck. Good agreement between calculated and the measured fracture load was obtained. 16 ref. (Q27, Q25, ST)

177-Q. Solution to the Rolling Problem for a Strain-Hardening Material by the Method of Discontinuities. Alice Winzer. *Journal of Applied Mechanics,* v. 18 *(Transactions of the American Society of Mechanical Engineers,* v. 73), Mar. 1951, p. 90-94.

Mathematical analysis and graphical interpretation. (Q25)

178-Q. Factors of Stress Concentration for Slotted Bars in Tension and Bending. M. M. Frocht and M. M. Leven. *Journal of Applied Mechanics,* v. 18, *(Transactions of the American Society of Mechanical Engineers,* v. 73), Mar. 1951, p. 107-108.

A concise presentation of data and information drawn chiefly from papers previously published. Results of photo-elastic analysis. (Q25, Q27, Q5)

179-Q. The Flow and Fracture of a Brittle Material. I. Cornet and R. C. Grassi. *Journal of Applied Mechanics,* v. 18, *(Transactions of the American Society of Mechanical Engineers,* v. 73), Mar. 1951, p. 120-122.

Discussion of paper by L. F. Coffin, Jr. (Sept. 1950 issue; item 654-Q, 1950). Includes author's closure. Data for gray cast iron are discussed. (Q23, Q26, CI)

180-Q. Creep of High-Purity Aluminum. *Technical News Bulletin,* (National Bureau of Standards), v. 35, Mar. 1951, p. 43-44. (Condensed from paper by Wm. D. Jenkins, *Journal of Research of the National Bureau of Standards,* v. 46, Apr. 1951. See item 205-Q.)

Curves show that plastic deformation of Al occurs in a discontinuous manner. Intergranular structure is illustrated. (Q3, Q24, Al)

181-Q. Prestressing Increases Aluminum Fatigue Life. *Iron Age,* v. 167, Mar. 22, 1951, p. 79.

Results of tests at National Bureau of Standards. (Q7, G23, Al)

182-Q. Mechanism of Primary Creep. Thomas G. Digges. *Metal Progress,* v. 59, Mar. 1951, p. 410, 412. (Condensed from "Mechanism of Primary Creep in Metals", W. A. Wood and R. F. Scrutton.)

Previously abstracted from *Journal of the Institute of Metals.* See item 665-Q, 1950. (Q3, Q24, Al)

183-Q. Fatigue Strength of Cold Worked Aluminum. *Metal Progress,* v. 59, Mar. 1951, p. 422. (Condensed from "The Use of Fatigue Tests in the Investigation of Structural Characteristics of Cold Worked Metals", R. Jacquesson and P. Laurent.)

Previously abstracted from *Revue de Métallurgie.* See item 3D-47, 1949. (Q7, Al)

184-Q. X-Ray Studies of Creep in Aluminum. Thomas G. Digges. *Metal Progress,* v. 59, Mar. 1951, p. 424. (Condensed from "The Mechanism of Creep as Revealed by X-Ray Methods", G. B. Greenough and Edna M. Smith.)

Previously abstracted from *Journal of the Institute of Metals.* See item 666-Q, 1950. (Q3, Q24, Al)

185-Q. How to Reduce Gear Failures. A. F. Brewer and P. J. Keating. *Steel,* v. 128, Mar. 26, 1951, p. 79-82.

Mechanisms of failure. Gear-oil additives and their functions. (Q9, S21, T7, ST)

186-Q. Photoelastic Stress Analysis Useful in Design of Metal Parts. Part I. Two-Dimensional Method. M. M. Leven. *Materials & Methods,* v. 33, Mar. 1951, p. 70-73.

The method and typical applications. (Q25)

187-Q. A Micro-Indentation Hardness Tester for Attachment to the Vickers Projection Microscope. S. J. Lloyd and D. J. Norris. *Journal of Scientific Instruments,* v. 28, Mar. 1951, p. 81-84.

Instrument for hardness tests with impression size of 5-10 μ. Extensive tests of the instrument have shown it to be accurate within the desired range. (Q29)

188-Q. Creep of High-Purity Aluminum Plotted. *Iron Age,* v. 167, Mar. 29, 1951, p. 89.

Recent work by W. D. Jenkins of National Bureau of Standards. (Q3, Al)

189-Q. The Effect of Grain Direction on Mechanical Properties of Light Alloy Extrusions. D. M. McElhinney. *Aircraft Engineering,* v. 23, Mar. 1951, p. 62-66.

Detailed results of experiments. Effect of stress concentrations on tensile strength in the various grain directions was also explored. Several British Al alloys (compositions given) were investigated. (Q24, Q25, Al)

190-Q. The Elastic Parameters of Beta-Brass. Robert A. Artman and Donald O. Thompson. *Journal of Applied Physics,* v. 22, Mar. 1951, p. 358.

As part of an investigation some of the physical properties of β-brass on and near the Cu-rich side of β-phase boundary, the elastic parameters of β-brass at 25° C. were measured. (Q21, Cu)

191-Q. Mechanism of Metallic Fracture. Georges A. Homes and Jacques Gouzou. *Engineers' Digest,* v. 12, Feb. 1951, p. 40-44. (Translated and condensed.)

Previously abstracted from *Revue de Métallurgie.* See item 825-Q, 1950. (Q26, Zn, CN)

192-Q. Statistical Aspects of Fatigue Strength. W. Weibull. *Engineers' Di-*

gest, v. 12, Feb. 1951, p. 57-60. (Translated and condensed.)

Previously abstracted from *Teknisk Tidskrift*. See item 95-Q, 1950. (Q7)

193-Q. The Nimonic Series of Alloys. *Nickel Bulletin*, v. 23, Nov. 1950, p. 198-204.

Tabular data on physical and mechanical properties. Applications. (Q general, P general, T general, Ni)

194-Q. Frictional Properties of Tungsten Carbide and of Bonded Carbides. K. V. Shooter. *Research*, v. 4, Mar. 1951, p. 136-139.

Frictional properties of tungsten carbide and of four bonded carbides were investigated at slow sliding speeds and under heavy load. The surface damage when carbide and metal slide together is comparable with that found for other softer metals. The presence of Co in the bonded carbides does not produce any very great difference in behavior. Repeated stressing of the bonded carbide leads to a sudden increase of heavy wear and to a rise in friction. (Q9, C-n, W)

195-Q. Damaged Impressions in Microhardness Testing. P. Grodzinski. *Research*, v. 4, Mar. 1951, p. 140-141.

In a number of recent papers on microhardness testing, indentations have been illustrated in which there are irregular outlines due to cracking and splintering of the material under test; this impairs the accuracy of measurement. The author has designed a double-cone diamond indenter with which cracking is avoided under practically any load in the micro-macro range. (Q29)

196-Q. A Review of Some Electronic Instruments for Use in Industry. S. F. Smith. *Sheet Metal Industries*, v. 28, Mar. 1951, p. 247-255; disc. p. 255-256, 264.

Strain-measurement and vibration testing. Compares strain gages and extensometers. Stroboscopic equipment and its uses. (Q25, S general)

197-Q. Fundamental Aspects of the Cold Working of Metals. Maurice Cook and T. Ll. Richards. *Journal of the Institute of Metals*, v. 78, Jan. 1951, p. 463-482.

Nature of the metallic state and metallic cohesion in terms of the electron theory of metals. The various mechanisms involved in plastic deformation include crystallographic slip, twinning, and kinking, and a shear mechanism to which particular attention is drawn because of its importance in many metal fabrication processes. Influence of plastic deformation on structure with special reference to the development of preferred orientation. The effect of deformation on fine structure as revealed by x-ray diffraction and the relation of work hardening and plasticity to structural changes brought about by cold working. 37 ref. (Q24)

198-Q. Some Experiments on Phonograph Needles. (In Japanese.) Taro Hisada and Hideo Nagasu. *Journal of Mechanical Laboratory*, v. 4, Sept. 1950, 164-173.

Mechanical properties of phonograph needles were studied as well as methods for convenient measurements of these properties. Apparatus and results. (Q general, ST)

199-Q. Fatigue Strength and Damping Capacity of Timepiece Springs. (In Japanese.) Tetsutaro Mitsuhasi and Kazuo Tsuya. *Journal of Mechanical Laboratory*, v. 4, Sept. 1950, p. 180-185.

The relation between damping capacity and fatigue strength of timepiece springs. Results are summarized in English. (Q7, Q8, T7, ST)

200-Q. Form Effect (Gestalt-Festigkeit) of the Leaf Springs. (In Japanese.) Hisao Matsumoto and Kaoru Kamata. *Journal of Mechanical Laboratory*, v. 4, Sept. 1950, p. 186-190.

Effects of lowering the stress concentration of the center bolthole by changing hole shape and section shape. (Q25, T7, AY)

201-Q. Study on Application of Material. Mechanism of Tensile Failure of Induction-Hardened Steel. (Study of High-Frequency Quenching No. 3.) (In Japanese.) Hisao Matsumoto and Katsuyoshi Kimura. *Journal of Mechanical Laboratory*, v. 4, Sept. 1950, p. 196-200.

Data are tabulated, charted, and discussed. (Q27, J2, CN)

202-Q. Study of Wear of Steel Against Soil. II. (In Japanese.) Tetsutaro Mitsuhasi, Yutaka Imai, and Shin Yokoi. *Journal of Mechanical Laboratory*, v. 4, Dec. 1950, p. 291-298.

Results of study made to improve the wear of soil-tillage parts of agricultural implements are tabulated, charted, and summarized in English. A carbon steel was used. (Q9, CN)

203-Q. A Microhardness Tester for Metals at Elevated Temperatures. Abner Brenner. *Plating*, v. 38, Apr. 1951, p. 363-366.

Apparatus designed primarily for use on electrodeposits. Reproducibility was determined by measurements on a Mo specimen at room temperature, 400, 600, and 800° C. Other typical data are tabulated and charted. (Q29)

204-Q. Static Friction Tests With Various Metal Combinations and Spe-

cial Lubricants. H. S. White and Dino Zei. *Journal of Research of the National Bureau of Standards,* v. 46, Apr. 1951, p. 292-298.

An inclined-plane apparatus was used in obtaining static-friction data for various lubricants with different metal combinations. Special lubricants, such as chlorinated and fluorinated hydrocarbons, were compared with a reference mineral oil. Effects of additives, such as graphite, molybdenum disulfide, zinc oxide, boron nitride, and an oxidized petroleum compound were investigated. Metal combinations involving stainless steels, carbon steel, cast iron, Al alloy, and Cr plate were used.
(Q9, SS, CN, CI, Al, Cr, SG-c)

205-Q. Creep of High-Purity Aluminum. William D. Jenkins. *Journal of Research of the National Bureau of Standards,* v. 46, Apr. 1951, p. 310-317.

A study was made of cold drawn Al at 105° F., to determine effects of variations of creep rate on mechanism of deformation. Extension on loading and extension at the beginning of the third stage both increased with increase in stress. Cyclic temperature changes appeared to increase the ductility. Discontinuous flow was evidenced in constant-load creep tests at 105° F. and in tensile tests at 80° F. Conformance to Andrade's law of transient flow was found within a limited range of strain rates. A mechanism of flow based on observed structural changes is proposed. 14 ref.
(Q3, Q24, Al)

206-Q. Applications of Bonded Wire Strain Gages. Francis G. Tatnall. *Tool Engineer,* v. 26, Apr. 1951, p. 28-31.

Survey includes several schematic diagrams. (Q25)

207-Q. Design and Calculation of Spot-Welded Joints Under Static Shear Loads. H. Zschokke and R. Montandon. *Engineers' Digest,* v. 12, Mar. 1951, p. 85-89. (Translated and condensed.)

Previously abstracted from *Schweizer Archiv für angewandte Wissenschaft und Technik.* See item 778-Q, 1950.
(Q2, Q27, K3, CN, SS, Al)

208-Q. Further Study of Metal Transfer Between Sliding Surfaces. J. T. Burwell and C. D. Strang. *National Advisory Committee for Aeronautics,* Technical Note 2271, Jan. 1951, 39 pages.

Study made to determine the role played by transfer of metal from one rubbing surface to another in the formation of characteristic surface coatings on certain piston-ring materials during run-in in an aircraft engine. Detection of this transfer was accomplished by a radioactive-tracer technique. Materials examined consisted of nitralloy steel, both nitrided and unnitrided, and several different types of Cr-plated surfaces. Effects on transfer of load, speed, distance of travel, repeated travel over the same path, hardness of the moving surface, and type of Cr plate were studied. Possible pretreatment to obtain a desirable surface layer might consist of running rings in a special cylinder having walls of selected composition and controlled hardness to give surface coatings of highly improved characteristics in a minimum length of time. 14 ref.
(Q9, AY, Cr)

209-Q. Creep of Lead at Various Temperatures. Peter W. Neurath and J. S. Koehler. *National Advisory Committee for Aeronautics,* Technical Note 2322, Mar. 1951, 32 pages.

A creep apparatus capable of measuring the stress-strain-time relation in the strain range 10^{-4} to 10^{-2} in. per in., with some accuracy and at temperatures down to that of liquid nitrogen was constructed. Single crystals of Pb were grown and oriented by X-ray analyses for testing. Some Cu and two Zn crystals were also grown and tested.
(Q3, Pb, Cu, Zn)

210-Q. Fatigue Testing Machines for Applying a Sequence of Loads of Two Amplitudes. Frank C. Smith, Darnley M. Howard, Ira Smith, and Richard Harwell. *National Advisory Committee for Aeronautics,* Technical Note 2327, Mar. 1951, 31 pages.

Construction, operation, and calibration of two nominally identical fatigue-testing machines built at the National Bureau of Standards. It is possible to measure continuously the loads once established to an accuracy of ±3%. Preliminary tests made with these machines on Alclad, 75S-T, Al alloy sheet indicate that the loads once set remained constant to within ±1% for the necessary number of loading cycles. 17 ref. (Q7, Al)

211-Q. Cooperative Investigation of Relationship Between Static and Fatigue Properties of Heat-Resistant Alloys at Elevated Temperatures. *National Advisory Committee for Aeronautics,* Research Memorandum 51A04, Mar. 7, 1951, 51 pages.

A progress report by the NACA Subcommittee on Heat-Resisting Materials. Data from static tensile and rupture tests, combined dynamic and static stress tests, and completely reversed stress fatigue tests are reported at room temperature, 1000, 1200, 1350, and 1500° F. Results

are summarized as curves of alternating stress vs. mean stress for fracture in 50, 150, and 500 hr. Some creep data under combined stress conditions and fracture characteristics of the specimens are included. (Q4, Q7, SG-h)

212-Q. The Experimental Exploration of Plastic Flow in Sheet Metals. L. R. Jackson and W. T. Lankford. *American Society for Testing Materials,* "Symposium on Plasticity and Creep of Metals," 1950, p. 3-12; disc. p. 13-17.

Data for killed drawing steel, "vitrenamel" (a rimmed low-carbon steel), and copper. Shows that, when anisotropy in real materials is taken into account, some of the current theory appears to correlate flow results very well both in accounting for the stress required to maintain flow and in describing the distribution of strain resulting from various stress systems. (Q24, Cu, CN, ST)

213-Q. Forming Parameters and Criteria for Design and Production. William Schroeder. *American Society for Testing Materials,* "Symposium on Plasticity and Creep of Metals," 1950, p. 18-36.

Generalized stress and strain; dimensional similarity; laws of fracture; classification of formed sheet-metal parts; basic types of forming action, including stretching, bending, and drawing; and significant parameters and criteria for these three types of forming. Data are tabulated and plotted for 24S-O Al-alloy and S-816 alloy. 24 ref. (Q24, F general, G general, Al, SS)

214-Q. The Use of Creep Data in Design. Howard C. Cross and L. R. Jackson. *American Society for Testing Materials,* "Symposium on Plasticity and Creep of Metals," 1950, p. 37-47; disc. p. 48-49.

Describes creep data available at the present time for airplane applications and limitations in its interpolation and extrapolation. Types of additional data that would be of greatest usefulness in the design problems confronting designers in the use of metals for high-temperature service. 18 ref. (Q3, SG-h)

215-Q. Super Creep-Resistant Alloys. J. W. Freeman, D. N. Frey, E. E. Reynolds, and A. E. White. *American Society for Testing Materials,* "Symposium on Plasticity and Creep of Metals," 1950, p. 50-68.

Factors which control the creep and rupture strength of superalloys used in jet engines. Processing conditions, final treatment, and chemical composition. 28 ref. (Q3, Q4, SG-h)

216-Q. A Method of Fatigue Testing Drill Rods. T. W. Wlodek. *Canadian Mining and Metallurgical Bulletin,* v. 44, Mar. 1951, p. 181-189; disc. p. 189-190; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 111-119; disc. p. 119-120.

Simplified method of fatigue testing full-dimension, as-rolled, nonmachined, mining drill rods. The type of loading applied more or less simulates working conditions of the outside fibers of the drill rods. Additional advantages are the possibility of testing under dry and wet conditions, quietness, and ease of operation. S-N curves under dry conditions were determined for SAE 1080 Cr-Mo and Ni-Cr-Mo steels. (Q7, CN, AY)

217-Q. The Effect of Shot Peening, and Shot Peening and Stress Relief, on the Fatigue Properties of SAE 1080 Steel. N. B. Brown. *Canadian Mining and Metallurgical Bulletin,* v. 44, Mar. 1951, p. 191-195; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 121-125.

Effect of low-temperature stress relief at 232.2° C. Specimens were first annealed. One half of the bars were then normalized and the other half water-quenched and drawn. Specimens with each heat treatment were tested in tensile, notched-bar impact, and fatigue. Data are tabulated and charted. (Q7, G23, J1, CN)

218-Q. The Fatigue Strength of Welded 18-8 Steel at High Temperature. (In Swedish.) Ivar Weibull and Per Davidson. *Jernkontorets Annaler,* v. 134, no. 12, 1950, p. 559-571.

Investigated at 650° C. Four different steels were tested, of which two were stabilized with Ti, one with Cb and one (with a very low carbon content) unstabilized. Best results were obtained with a Ti-alloyed steel, free grain-boundary carbide and with a very low content of δ-ferrite in the weld zone. It is believed that Cb-alloyed steel would give at least as good results under similar conditions. 10 ref. (Q7, SS)

219-Q. Exchange of Ideas on Schnadt's Notch-Impact-Testing Procedure (In Dutch.) *Smit Mededelingen,* v. 5, Oct.-Dec. 1950, p. 97-132; disc. p. 132-135.

Entire issue consists of discussions by different authors on theoretical considerations and practical results of above method. Principal contributors are J. H. Palm, J. A. Haringx, G. Westendorp, H. C. Goosens, and J. H. van der Veen. H. M. Schnadt and others participated in the informal discussion

which follows the formal presentation. (Q6)

220-Q. Relationship of Cross-Sectional Area and Fatigue Strength for Different Materials. (In German.) H. Wiegand. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, Feb. 1, 1951, p. 89-91.

Effects of various factors on the above for different ferrous and nonferrous materials. (Q7)

221-Q. Research on the Strength of Sintered-Iron Compacts. (In German.) Georg Bierett and Theodor Hövel. *Stahl und Eisen,* v. 71, Jan. 18, 1951, p. 77-82.

Tensile tests on sintered-iron rings show that their strengths depend greatly on their i.d.-o.d. ratio and on pressure applied during the sintering process, as well as on grain size. 13 ref. (Q27, H15, Fe)

222-Q. Development and Status of Heat Resistant Rolled and Forged Steels. (In German.) Karl Bungardt. *Stahl und Eisen,* v. 71, Mar. 15, 1951, p. 273-281; disc. p. 281-283.

Various heat resistant steels and the effect of additions (such as Ti) on their mechanical and oxidation resistance properties. 30 ref. (Q general, R2, AY, SG-h)

223-Q. Hardness Testing With Asymmetrical Indenters. (In German.) H. Meincke. *Metalloberfläche,* v. 5, ser. A, Feb. 1951, p. 17-21.

On comparing the effect of different indenters in the hardness testing of monocrystals and anisotropic substances, it was found that more accurate results could be obtained with one-dimensional indenters and that the resulting hardness readings can be more readily correlated with tensile strengths. 15 ref. (Q29)

224-Q. Fracture of a Heavy Cast-Steel Drive Wheel. (In German.) Hermann Schropp. *Giesserei,* v. 38 (new ser., v. 4), Jan. 25, 1951, p. 33-34.

Analysis of the fracture indicated the cause to be hot shortness, most probably caused by delay in removal of the casting from the mold and improper design. The high impact brittleness may be the result of annealing too long or at too high a temperature. (Q26, CI)

225-Q. Wear Testing by Means of a Machine Using Mineral Abrasives. (In German.) H. Timmerbeil. *Giesserei,* v. 38 (new ser., v. 4), Feb. 8, 1951, p. 52-54.

Machine shows that the wear resistance of parts and revolving plates subject to wear can be vastly improved by weld deposition of hard metals. Includes photographs and graphs showing the relative effect of different hard-metal deposits on wear resistance. (Q9, L24)

226-Q. The Effect of Sulfur and Iron on Binary Lead Bronzes. (In German.) A. Rühenbeck. *Giesserei,* v. 38 (new ser., v. 4), Mar. 8, 1951, p. 103-106.

Investigated because of the increased use of scrap metal for Pb bronze bearings. It was found that the optimum Pb:S ratio is 100:1 and that Fe in excess of its solubility limit in Cu produces a spherical, fine-grained structure with above-average strength and bearing properties. (Q23, M27, Cu, SG-c)

227-Q. The Further Development of Al-Zn-Mg Alloys for Use in Sheet Metal and Rivets. (In German.) H. G. Petri, G. Siebel, and H. Vosskühler. *Metall,* v. 5, Feb. 1951, p. 47-52.

Sheets containing 4.5% Zn, 3.5% Mg, 0.3% Cu, 0.3% Mn, 0.15% Cr, and 0.03% V were found to have adequate strength properties; to be almost completely stress-corrosion resistant; but are insufficiently malleable, except when freshly solution annealed. Two new alloys have higher malleability and satisfactory properties. 17 ref. (Q23, R1, Al)

228-Q. Equalization of Measuring Errors in G. Sachs's Boring Process for Detection of Internal Stresses in Bars and Tubes. (In German.) H. Böhler and W. Schreiber. *Metall,* v. 5, Feb. 1951, p. 53-57.

An improvement of Sachs's method for determining 3-dimensional stresses by mathematical instead of graphical means. 10 ref. (Q25)

229-Q. Local Strength of Extruded Shapes. II. Shapes With "Wood Fiber" Fracture. (In German.) H. Kostron. *Metall,* v. 5, Feb. 1951, p. 58-63.

Formation of fractures which resemble cracks in wood. These are formed by aggregation of intermetallic compounds. Tests were made to determine effects of these aggregates on local strength properties of extruded Al-base alloys containing Cu and Mg. A casting procedure which practically eliminates the difficulty. (Q26, E25, Al)

230-Q. Alternating-Stress Hardness; Concept and Method of Measurement. (In German.) W. Späth. *Metall,* v. 5, Mar. 1951, p. 98-101.

Critical discussion of static hardness tests. Testing equipment and procedure for determining hardness changes resulting from compression stresses applied in rapid succession. Data for six plain carbon and alloy steels, also for brass and Al. (Q29, CN, AY, Al, Cu)

231-Q. Ten Zirconium Alloys Evaluated. F. B. Litton. *Iron Age,* v. 167,

Apr. 5, 1951, p. 95-99; Apr. 12, 1951, p. 112-114.

Mechanical and oxidation resistance properties of zirconium alloyed with 10 different elements including O_2 and N_2. Hf up to 8.2% did not affect tensile properties. Al increased strength as did Ti, Cb, O_2, and N_2. In general Zr alloys are not as resistant to oxidation as the commercially pure metal. Minor amounts of Al and N_2 decreased, while O_2 slightly increased, oxidation resistance. Arc-melted metal had better resistance to oxidation than did induction or graphite-crucible-melted Zr. (Q23, R2, Zr)

232-Q. Report of Ship Structure Committee. *Welding Journal,* v. 30, Apr. 1951, p. 169s-181s.

Second of a series of technical progress reports to the Secretary of the Treasury by the Ship Structure Committee. Materials, fabrication, locked-in stress, design, and statistical report of structural performance of steel merchant vessels. 14 ref. (Q25, S12, CN)

233-Q. Some Metallurgical Aspects of Ship Steel Quality. R. W. Vanderbeck. *Welding Journal,* v. 30, Apr. 1951, p. 192s-194s.

Discusses paper by H. M. Banta, R. H. Frazier, and C. H. Lorig. (Feb. 1951 issue; item 95-Q, 1951.) (Q23, T22, CN)

234-Q. Statistical Analysis of Tests of Charpy V-Notch and Keyhole Bars. J. A. Rinebolt and W. J. Harris, Jr. *Welding Journal,* v. 30, Apr. 1951, p. 202s-208s.

Analysis which established the degree of fluctuation of energy and of transition temperatures of steels prepared in the laboratory, having compositions close to 0.30% C, 1.00% Mn, and 0.30% Si. (Q6, CN)

235-Q. Compression Test Extensometer for Cylinder Specimens. A. M. Stott and J. M. McCaughey. *Product Engineering,* v. 22, Apr. 1951, p. 157-160.

Development of an instrument for obtaining accurate stress-strain data when testing cylindrical specimens in compression. It can be used for ferrous and nonferrous materials at temperatures ranging from −70 to 400° F. (Q28)

236-Q. Photoelastic Stress Analysis Useful in Design of Metal Parts. Part 2. Three-Dimensional Photoelasticity. M. M. Leven. *Materials & Methods,* v. 33, Apr. 1951, p 89-92.

The relatively new "frozen stress" technique, said to be ideal where it is difficult to use other methods of experimental stress analysis. (Q25)

237-Q. The Hardness and Strength of Metals. D. Tabor. *Journal of the Institute of Metals,* v. 79, Mar. 1951, p. 1-18.

Using a spherical indenter of fixed diameter to make hardness indentations, as in the Brinell test, it was found that the load necessary to produce an indentation of a certain chordal diameter d is given by the relationship which depends on degree of work hardening of the metal. Shows that the stress-strain curve of the metal may be derived from the hardness measurements. A series of curves shows the variation of the ratio of tensile strength to hardness with Meyer index. Materials as diverse as tool steel, work hardened Ni, and annealed Cu all lie near the theoretical curves. A similar analysis is given for pyramidal indenters such as used in making Vickers hardness measurements. 10 ref. (Q29, Q23)

238-Q. (Pamphlet) **Symposium on Plasticity and Creep of Metals.** 68 pages. 1950. *American Society for Testing Materials.* Special Technical Publication 107, 1950. 68 pages. $1.50.

Introduction by John E. Dorn and four papers which are abstracted separately. (Q23, Q3, Al, Cu, ST)

239-Q. (Book) **The Friction and Lubrication of Solids.** F. P. Bowden and D. Tabor. 337 pages. 1950. Clarendon Press, Oxford, England.

An experimental study of the physical and chemical processes that occur during the sliding of solids—particularly of metals—and an investigation into the mechanism of friction and boundary lubrication. Physical properties of solid surfaces. Chapter bibliographies. (Q9)

240-Q. (Book) **Estado Actual del Promblema de la Rotura de los Metales.** (The Present Position as Regards the Failure of Metals.) Carlos Fernandez Casado. 87 pages. Instituto de la Soldadura, Madrid, Spain.

The four principal criteria for failure—maximum principal stress, maximum dilation, maximum shear stress, and maximum energy of deformation—are compared and a provisional theory of failure is advanced. The phenomena of failure in simple tension, plastic flow in single crystals and polycrystalline materials; and factors influencing the development of failure. Includes list of some 100 technical terms in Spanish, English, German, French, and Italian. (Q23)

241-Q. Formulas for the Determination of Residual Stress in Wires by the Layer Removal Method. W. T. Read, Jr. *Journal of Applied Physics,* v. 22. Apr. 1951, p. 415-416.

The distribution of residual axial stress in a beam or wire of circular cross section is derived as a function of the moment required to straighten the wire after removal of successive layers of material. Application of the formulas involves two graphical differentiations and integrations of experimental curves. (Q25)

242-Q. The Deformation of Gold Wire at High Temperature. B. H. Alexander, M. H. Dawson, and H. P. Kling. *Journal of Applied Physics,* v. 22, Apr. 1951, p. 439-443.

Gold wires were subjected to small tensile stresses at high temperatures and the strain-time relationship, coefficient viscosity, and surface energy were determined. Theories to explain viscous behavior of metals. (Q24, P10, Au)

243-Q. Improved Tests Evaluate Nodular Iron. W. W. Austin, Jr. *Iron Age,* v. 167, Apr. 19, 1951, p. 86-89.

Physical and mechanical properties of nodular iron obtained from keel-block tensile specimens. Use of the standard ASTM 0.625-in.-diam. malleable test bar.
(Q27, P general, CI)

244-Q. Residual Grinding Stresses in Mild Steel. J. Frisch and E. G. Thomsen. *Transactions of the American Society of Mechanical Engineers,* v. 73, Apr. 1951, p. 337-342; disc., p. 342-346.

A method for determining residual surface stresses. It is necessary to remove small layers from the part which has been bent by residual stresses in the unrestrained state and to measure the resulting change in deflection and thickness of metal removed. Etching with a weak HNO_3 solution was found to be a satisfactory method for removing surface metal without introducing additional stresses. Results for mild steel. (Q25, G18, CN)

245-Q. Behavior of Molybdenum and Tungsten in Low and Medium Temperature Ranges. E. Nachtigall. *Powder Metallurgy Bulletin,* v. 6, Apr. 1951, p. 26-31.

Oxidation behavior, hardness, tensile strength, and elongation of Mo and W below 500° C.
(Q27, Q29, R2, Mo, W)

246-Q. Brittle Fractures in Welded Bridges. P. R. Bijlaard. *Engineering News-Record,* v. 146, Apr. 26, 1951, p. 46-48.

Several examples with emphasis on fundamental principles.
(Q26, T26, CN)

247-Q. Wire Strain in Screen Weaving. R. Traon. *Wire and Wire Products,* v. 26, Apr. 1951, p. 299-301.

Results of an investigation including equations for expressing internal strain and methods of remedying it. (Q25, G6)

248-Q. Some Properties of High-Purity Sintered Wrought Molybdenum Metal at Temperatures Up to 2400° F. R. A. Long, K. C. Dike, and H. R. Bear. *National Advisory Committee for Aeronautics,* Technical Note 2319, Mar. 1951, 75 pages.

Studies were made on tensile strength, stress-rupture properties, types of fracture, directional tensile properties of rolled plate, and metallography of swaged and recrystallized molybdenum.
(Q general, M general, Mo)

249-Q. Fatigue Strengths of Aircraft Materials; Axial-Load Fatigue Tests on Unnotched Sheet Specimens of 24S-T3 and 75S-T6 Aluminum Alloys and of SAE 4130 Steel. H. J. Grover, S. M. Bishop, and L. R. Jackson. *National Advisory Committee for Aeronautics,* Technical Note 2324, Mar. 1951, 66 pages.

Experimental investigation included the following: determination of fatigue strengths, in tests at a speed of about 1100 cycles per min., covering a range of mean loads from zero to a high tensile value, and, for each loading condition, lifetimes from 10,000 to 10,000,000 cycles; determination of fatigue strengths in tests at about 90 cycles per min.; several measurements of damage or strengthening at one stress level due to previous loading at another stress level. 17 ref. (Q7, Al, AY)

250-Q. Development of Magnesium-Cerium Forged Alloys for Elevated-Temperature Service. K. Grube, R. Kaiser, L. W. Eastwood, C. M. Schwartz, and H. C. Cross. *National Advisory Committee for Aeronautics,* Technical Note 2325, Mar. 1951, 91 pages.

Investigation included development of improved alloys, and a fundamental study correlating alloy composition and structure with resistance to creep. Nominal composition of the recommended alloy is 1.7% Mn, 2% Ce, 0.25% Ni, and balance Mg. (Q3, M27, Mg)

251-Q. A Mechanical Wear Test Using Fission Fragments. David H. Frisch and Jules S. Levin. *U. S Atomic Energy Commission,* AECU-1078, Aug. 15, 1950, 4 pages.

Previously abstracted from *ASTM Bulletin.* See item 148-Q, 1951.
(Q9, S19)

252-Q. Effects of Temperature Distribution and Elastic Properties of Materials on Gas-Turbine-Disk Stresses. Arthur G. Holms and Rich-

ard D. Faldetta. Thirty-Third Annual Report of the National Advisory Committee for Aeronautics, Technical Report 864. 1947. p. 67-73.

Calculated for a wide range of temperatures and centrifugal forces. Materials are not emphasized. Results are plotted. (Q25, Q21)

253-Q. Determination of Elastic Stresses in Gas-Turbine Disks. S. S. Manson. Thirty-Third Annual Report of the National Advisory Committee for Aeronautics, Technical Report 871, 1947, p. 241-251.

Finite-difference solution of the equilibrium and compatibility equations for elastic stresses in a symmetrical disk. Account is taken on point-to-point variations in disk thickness, in temperature, in elastic and in Poisson's ratio. Computations can be performed by nontechnical computers with little engineering supervision. Illustrative examples are presented. Effect of shrink fitting is taken into account. (Q21)

254-Q. The Application of Boltzmann's Superposition Theory of Materials Exhibiting Reversible β Flow. C. Henderson. *Proceedings of the Royal Society,* v. 206, Mar. 22, 1951, p. 72-86.

Boltzmann's theory of superposition is applied to flow and recovery of a material in the so-called anelastic region, in which deformations outside the elastic region are slowly recoverable on removing the stress. Experimental work to test the theory shows that the Andrade creep equation applies not only to large deformation of a completely irreversible character, but in this region also. Formulas are developed which give the amount of creep recovery, and of stress relaxation at constant strain, after any duration of an applied constant stress, for a material which at larger stresses exhibits the Andrade β flow. 10 ref. (Q22)

255-Q. Fracture Under Combined Stress Creep Conditions of 0.5% Mo Steel. A. E. Johnson and N. E. Frost. *Engineer,* v. 191, Apr. 6, 1951, p. 434-437.

Pure tension, pure torsion, and combined stress-creep tests were made at 550° C., to examine the validity of the Siegfried hypothesis of fracture under combined stress-creep conditions, and to establish a criterion of fracture. It was found that the results obtained cannot be explained upon the basis of the Siegfried criterion, and that the criterion of fracture is apparently the maximum principal stress. (Q26, Q3, AY)

256-Q. The Effect of Strain-Hardening on the Equalization of Moments in the Simple Plastic Theory. M. R. Horne. *Welding Research,* v. 5, Feb. 1951, (bound with *Transactions of the Institute of Welding,* v. 14) p. 147r-153r.

Tests have indicated that for mild-steel beams and portal frames, the principle of equalization of moments gives a close estimate of bending-moment distribution at collapse, but no tests have hitherto been made on higher carbon steels. Tests were performed on simply supported beams of varying carbon content and stress-strain curves from these experiments were used for a theoretical investigation of two rectangular-beam problems. A comparison is made between the plastic theory which ignores strain-hardening and that which takes strain-hardening into account. The same problems were also solved for an I-beam by using Hrennikoff's deflection coefficients for mild-steel beams bent beyond the elastic limit. (Q23, CN)

257-Q. Production Problems. III. Fracture Characteristics of Malleable Iron Castings. *Iron and Steel,* v. 24, Apr. 1951, p. 122-123.

In view of the pronounced differences in fracture characteristics of various hinge castings in malleable cast iron and because of the obvious embrittlement associated with certain components, microstructural investigation was completed. (Q26, M27, CI)

258-Q. The Slip, Twinning, Cohesion, Growth, and Boundaries of Crystals. H. Wilman. *Proceedings of the Physical Society,* v. 64, Apr. 1, 1951, p. 329-350.

Nature and stability of intercrystalline boundaries and conclusions as to preferred relative orientations illustrated by ball-bearing and bubble-raft models. Electron-diffraction evidence from crystals of layer-lattice, ionic, metallic, and van der Waals types shows that crystal pairs and symmetrical or unsymmetrical triplet of multiplet crystal groupings occur, having a common lattice row, but in relative azimuthal orientations at intervals agreeing with the predictions. The seven types of electron diffraction patterns observed, and the nature of the specimen preparation, suggest that origin of these groupings is mechanical deformation of the crystals during or after growth, by a process of "rotational slip". Such slip is demonstrated macroscopically as a deformation process in potassium ferrocyanide trihydrate and gypsum. 92 ref. (Q24, N5)

259-Q. A Surface Effect in the Creep Behaviour of Polycrystalline Lead. E. N. da C. Andrade and A. J. Kennedy. *Proceedings of the Physical Society,* v. 64, sec. B, Apr. 1, 1951, p. 363-366.

Results of some experiments with pure lead containing 0.05% Te. This addition gives a metal which, at room temperature, shows no permanent flow except at the highest stresses. Experiments were made with wires of four different diameters, grain diameter being very nearly the same in each case. (Q3, Pb)

260-Q. Modifications of the Structure of Aluminum During Creep. (In French.) G. Wyon and Ch. Crussard. *Revue de Métallurgie,* v. 48, Feb. 1951, p. 121-130.

Micrographic studies of intracrystalline structures formed during creep at 250-310° C. revealed several modifications of deformation. Slow-moving boundaries, valley formation on the surface, large angular and net bending, and networks of swelling in the finest grains or near the boundaries of large grains were some of the effects observed. 14 ref. (Q3, Al)

261-Q. A Theory of Deformation Structures in Metals. (In French.) W. R. Hibbard. *Revue de Métallurgie,* v. 48, Feb. 1951, p. 131-134.

Theory based on stable orientations of monocrystals and on slip and flow effects under a particular strain. 22 ref. (Q24)

262-Q. Transverse Stresses Resulting From Tensile Testing. (In French.) Bernard Jaoul. *Comptes Rendus hebdomadaires des Seances de l'Académie des Sciences,* v. 232, Feb. 5, 1951, p. 477-479.

Investigated for plane and tubular specimens of 99.99% Al. Results are subjected to theoretical analysis. (Q27, Al)

263-Q. Friction, Lubrication, and Wear; A Review of Publications of the Years 1944 to 1948. (In German.) Robert Kobitzsch. *Erdöl und Kohle,* v. 4, Jan. 1951, p. 9-17.

Covers German and foreign literature. 72 ref. (Q9)

264-Q. Comparison of Mohs' Hardness Scale With Results by Other Hardness Testing Methods. (In German.) Nikolaus Ludwig. *Metalloberfläche,* v. 5, ser. A, Mar. 1951, p. 38-42.

Photomicrographs, graphs, and tables supplement this comparative study of different methods of hardness testing. 23 ref. (Q29)

265-Q. Extruded and Forged Mg Alloys Containing Zirconium. (In German.) F. Sauerwald. *Metall,* v. 5, Mar. 1951, p. 101-103.

Effects of Cd, Zn, and heat treatment, and previous history of the alloys on their extrudability, forgeability, and other mechanical properties. 11 ref. (Q23, F22, F24, Mg)

266-Q. On Young's Modulus of Elasticity of Single Crystals of Nickel and Cobalt. (In English.) Kotaro Honda and Yuki Shirakawa. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, May 1949, p. 9-15.

New microscopic method for determination of Young's modulus. Results for single crystals of Co and Ni. 14 ref. (Q21, Co, Ni)

267-Q. On Young's Modulus and Its Temperature Coefficient of the Alloys of Cobalt, Iron and Chromium, and a New Alloy "Co-Elinvar". (In English.) Hakaru Masumoto and Kideo Saito. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, May 1949, p. 17-22.

(Q21, Co, Fe, Cr, SG-n)

268-Q. On the Mechanism of Cold Brittleness in Metals. (In English.) Tomiya Sutoki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, May 1949, p. 23-28.

Tensile and Charpy impact tests were made with Flodin iron, 0.3 and 0.7% C steels, Zn, and Al, at temperatures ranging from that of liquid Ni up to about 200° C. Results indicate that the ductile-brittle transformation temperature is not inherent in a particular metal, but is influenced by experimental conditions. 10 ref. (Q23, Fe, CN, Zn, Al)

269-Q. Theory of Plasticity. I. Correlation Between Lattice Transformation and Plastic Gliding in Metals. II. Critical Shear Stress of Binary Alloys. (In English.) Sakae Takeuchi and Hideji Suzuki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Feb. 1950, p. 50-67.

Part II includes correlation of theoretical conclusions with experimental observations for Au-Ag, Cu-Ni, and Cu-Zn alloys. (Q23, N general)

270-Q. Measurement of Coefficient of Static Friction of Metals. (In English.) Ryoji Aida. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Apr. 1951, p. 380-395.

Measurement for a wide variety of ferrous and nonferrous metals, also under different experimental conditions. Extensive tabular and graphical data. (Q9)

271-Q. Room Temperature Creep and Relaxation. *Metal Progress,* v. 59, Apr. 1951, p. 546, 548. (Translated and condensed from "Relaxation of Austenitic Steel at Room Temperature",

I. A. Oding and E. N. Volosatova.

Previously abstracted from *Doklady Akademii Nauk SSSR* (Reports of the Academy of Science of the USSR). See item 502-Q, 1950. (Q3, SS, Fe)

272-Q. Vibration and Fatigue Life of Steel Strand. J. C. Little, D. G. Macmillan, and J. V. Majercak. *Transactions of the American Institute of Electrical Engineers,* v. 69, pt. 2, 1950, p. 1473-1478; disc. p. 1478-1479.

See abstract of condensed version in *Electrical Engineering,* item 847-Q, 1950. (Q7, CN, SS)

273-Q. Effects of Prior Stress on the Fatigue of Aluminum Alloys. J. E. Bennett and J. L. Baker. *Light Metal Age,* v. 9, Apr. 1951, p. 16-17.

See abstract under similar title from *Journal of Research of the National Bureau of Standards,* item 15-Q, 1951. (Q7, Al)

274-Q. Navy Studies Jet Structural Alloys at Intermediate Temperatures. J. F. Erthal. *Iron Age,* v. 167, May 10, 1951, p. 91-95.

Room - temperature mechanical properties of Inconel X changed little after heating at 900° F. for up to 1000 hr. Strength of Stainless W increased up to 700° F., but 4340 decreased at this temperature. In some cases, impact properties of Stainless W were 60-170% higher at 700° F. than at room temperature. Results are of special significance because of aerodynamic heating incident to operation at supersonic speeds. (Q general, Ni, SS)

275-Q. An Automatic Light-Load Bergsman Type Hardness Tester. P. Grodzinski. *Journal of Scientific Instruments,* v. 28, Apr. 1951, p. 117-121.

By means of special equipment, fully automatic control was applied to operation of a stronger model of a Bergsman-type light-load hardness tester used in association with a Vickers projection microscope. Reliability of hardness testing was increased by eliminating manual control of the indenting operation and by redesigning the indenter. (Q29)

276-Q. Effect of Alloying Elements on True-Stress True-Strain Flow Curves of Pearlitic Steel. R. Raring, J. A. Rinebolt, and W. J. Harris, Jr. *Journal of Metals,* v. 3, May 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 395-400.

Effects of additions on true stress-strain curves of 0.30% C, 1.00% Mn, 0.30% Si pearlitic steel were studied. The elements investigated were C, Mn, Si, P, Ni, Cu, V, Mo, Cr, Al, B, S, and Ti. Alloys are compared on the basis of fracture stress, fracture strain, energy to fracture, rate of strain hardening, strain-hardening exponent, height of the flow curve, and lower yield point. 10 ref. (Q23, AY)

277-Q. The Effect of Brake Shoe Action on Thermal Cracking and on Failure of Wrought Steel Railway Car Wheels. Harry R. Wetenkamp, Omar M. Sidebottom, and Herman J. Schrader. *University of Illinois Bulletin,* v. 47, June 1950, 104 pages. (Engineering Experiment Station, Bulletin Series 387.)

Mechanical-property data were obtained for wheels having two types of heat treatment, various carbon contents, and two methods of wheel manufacture. Data were from notched and unnotched static tension specimens, Brinell-hardness determinations, and endurance limits for notched and unnotched rotating-beam, bending-fatigue specimens. For a few types of wheels, a photomicrographic study was made of structure of the material before and after drag testing. A number of variables of heat treatment, wheel design, carbon content, and method of wheel manufacture were investigated. (Q general, S21, CN)

278-Q. An Investigation of Creep, Fracture, and Bending of Arsenical Lead Alloys for Cable Sheathing—Series 1949. Curtis W. Dollins. *University of Illinois Bulletin,* v. 47, Oct. 1950, 60 pages. (Engineering Experiment Station, Bulletin Series 394.)

The data cover creep rates under steady tensile stresses up to 300 psi., time to fracture under steady stresses of 400 to 2000 psi., and number of cycles to fracture in slow bending. Small amounts of As in combination with other constituents and with proper production technique were shown to produce a marked improvement in creep resistance, life to fracture, and ability to withstand bending. This improvement appears to be due to retardation of recrystallization at the stresses and temperatures generally encountered in service. 17 ref. (Q3, Q5, Q26, Pb)

279-Q. Strainhardening and Softening With Time in Reference to Creep and Relaxation in Metals. A. Nadai. *American Society of Mechanical Engineers,* Paper 50-A-121, 1950, 24 pages.

Analytical expressions for describing the influence of strain hardening, of the time rate of change of the flow resistance, and of recovery strains on creep and relaxation of metals under uniaxial stress. (Q3)

280-Q. Relaxation of Stress in a Heat Exchanger Tube of Ideal Ma-

terial. E. A. Davis. *American Society of Mechanical Engineers,* Paper 50-A-122, 1950, 11 pages.

Analytical solutions of the relaxation of an elasticoviscous tube in a rigid tube sheet in both plane stress and modified plane strain are worked out. Effect of reloading tensile specimens in relaxation and results of tests on an Al alloy. (Q27)

281-Q. Effect of Vanadium on the Properties of Cast Chromium-Molybdenum Steels. N. A. Ziegler, W. L. Meinhard, and J. R. Goldsmith. *American Foundrymen's Society,* Preprint 51-2, Apr. 1951, 14 pages.

An investigation was made of microstructures, transformation temperatures, mechanical properties, and weldability of 1.25% Cr + 0.5% Mo, 2.5% Cr +0.5% Mo, and 5.0% Cr + 0.5% Mo cast steels, in which V ranged from 0 to 0.3% and carbon from 0.1 to 0.3% in each group. Results are presented in graphs and photomicrographs. 12 ref. (Q general, M27, N8, K9, CI)

282-Q. Influence of Silicon Content on Mechanical and High-Temperature Properties of Nodular Cast Iron. W. H. White, L. P. Rice, and A. R. Elsea. *American Foundrymen's Society,* Preprint 51-5, Apr. 1951, 9 pages.

Two series of cast irons of similar compositions, one containing flake and the other containing spheroidal graphite, were used. Growth and sealing characteristics were also investigated. (Q general, P general, CI)

283-Q. Effect of Phosphorus Content on Mechanical Properties of a Nodular Cast Iron. J. E. Rehder. *American Foundrymen's Society,* Preprint 51-43, Apr. 1951, 8 pages.

Mg-treated irons only are discussed, but results are applicable to other nodular irons. Photomicrographs show course of the graphitization process under different conditions of composition, heat treatment, etc. (Q general, E25, CI)

284-Q. Melt Quality and Fracture Characteristics of 85-5-5-5 Red Brass and 88-8-4 Bronze. R. D. Shelleng, C. Upthegrove, and F. B. Rote. *American Foundrymen's Society,* Preprint 51-55, Apr. 1951, 10 pages.

Third progress report by Research Committee of A.F.S. Brass and Bronze Div. on development of a fracture-test procedure for evaluating the melt quality of brass and bronze alloys. Effects of variations in size and shape of the chill block casting and variation in temperature of the chiller from room temperature to 700° F. on the fracture appearance of 85-5-5-5 alloy chill blocks. A determination of the cooling rates in a ¾ in. x 3 in. x 6 in. chill block was also made. Relations between melt quality and appearance of 88-8-4 alloys. Influence of degassing with dry N_2 on the fracture appearance and melt quality of 85-5-5-5 and 88-8-4 alloys. (Q26, E25, Cu)

285-Q. A High-Speed, High-Temperature Precision Testing Machine for Gas Turbine Disk Research. A. C. Hagg, B. Cametti, and G. O. Sankey. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, No. 2, 1951, p. 17-28.

Apparatus can handle disk specimens up to 14 in. in diam. and 2 in. thick, and larger specimens can be handled with only minor modifications. The furnace is designed for a specimen temperature up to 1500° F. which may be uniform with radical gradients up to about 100° F. per in. Primary emphasis was placed on means for accurate measurement and control of specimen speed and temperature, and on determination of plastic and creep status. (Q27, Q3, SG-h)

286-Q. Bursting Tests of Rotating Disks Typical of Small Gas Turbine Design. Wallace E. Skidmore. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, No. 2, 1951, p. 29-48.

A variety of disks, mostly of simple basic shapes, were made and tested to destruction. Some of the items investigated were effect of material, profile, centrally located holes, and blade loading. Yield speed, bursting speed, and elongation data were obtained. Stresses for yield and ultimate speeds were computed in terms of average stress and maximum elastic stress. Results were compared with material tensile properties determined from tensile test coupons. Results indicated that theoretical elastic stresses are not always a definite criteria of failure. (Q21, Q23)

287-Q. Passenger Car Frame Analysis and Strain Gage Tests. V. L. Green. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, No. 2, 1951, p. 49-62.

Details of the work, including overall and detailed diagrams. Benefits obtained from the tests. (Q25, CN)

288-Q. A Method of Inferring the Strength of Structures at High Temperature From Room Temperature Model Tests. W. Kenneth Bodger. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, No. 2, 1951, p. 63-68.

Method developed for using the results of tests on ordinary plastic materials to predetermine the load-

carrying capacity of a structure which operates under creep conditions. Geometric similarity of model and prototype are assumed. The method was applied in detail to the case of a structure whose deformation is due largely to bending; it can readily be adapted to cases of tension, shear, or combined stresses. A suggestion is made for studying the problems of creep in structures by photoelastic methods. (Q25, Q3)

289-Q. Transverse Waves in Beams. Irwin Vigness. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, No. 2, 1951, p. 69-82.

Object was primarily to describe the lateral motions of a beam under controlled impact conditions. The problem was originally initiated to explain features associated with transmission of mechanical shock waves and to determine maximum stresses occurring in simple structures under impact conditions. Experimental results are compared with those of infinite-beam theory as well as some results of the theory of finite beams. 12 ref. (Q6)

290-Q. Deflection Tests of Plastic Models. Roscoe Meadows, Jr. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, No. 2, 1951, p. 117-128.

Scale models of a gun turret and of a low-pressure steam-turbine casing were tested to find relative deflections to be expected in prototypes. Two groups of box girder models were made. Each group contained dimensionally identical girders of cellulose acetate, methyl, methacrylate and brass, and geometrically similar girders of different scales. Deflections of these girders under various loads were measured and compared with calculated deflections. From these comparisons, methods of overcoming errors due to creep, temperature variations, and aging of cemented joints were developed. 11 ref. (Q25)

291-Q. Some Observations on Photoelastic Materials Stressed Beyond the Elastic Limit. Bernard Fried. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, No. 2, 1951, p. 143-148.

Materials studied were polystyrene, lucite, plexiglass, nylon, cellulose acetate, AgCl, and cellulose nitrate. The most suitable material tested, from the point of view of application to solution of problems in technical mechanics, was cellulose nitrate. (Q25)

292-Q. Factors of Stress Concentration in Bars With Deep Sharp Grooves and Fillets in Tension. M. M. Frocht and D. Landsberg. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, No. 2, 1951, p. 149-162; disc. p. 163-170.

Determined photo-elastically. Results are limited to the elastic range. Apparatus and data; photo-elastic stress patterns. Includes extensive discussion by A. J. Durelli and R. H. Jacobson. 13 ref. (Q25)

293-Q. Advances in High-Temperature Strain Gages and Their Application to the Measurement of Vibratory Stresses in Hollow Turbine Blades During Engine Operation. R. H. Kemp, W. C. Morgan, and S. S. Manson. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, No. 2, 1951, p. 209-228.

Improved high-temperature strain gage found satisfactory for measuring vibratory strains in a turbine blade during operation of a turbojet engine. Components were Karma wire or 80% Pt, 20% Ir tubular lead wires, National Bureau of Standards L-6AC precoat, and Quigley AAA No. 1925 cover ceramic. Strain sensitivity was measured statically at room temperature and dynamically at temperatures up to 1500° F. (Q25)

294-Q. The Significance of Mechanical Testing. E. W. Blumer. *Australasian Engineer,* v. 44, Jan. 8, 1951, p. 65-69.

Tensile, impact, and bend testing. (Q27, Q5, Q6)

295-Q. The Equilibrium of Linear Arrays of Dislocations. J. D. Eshelby and F. R. N. Nabarro. *Philosophical Magazine,* ser. 7, v. 42, Apr. 1951, p. 351-364.

A method for finding the equilibrium positions of a set of like dislocations in a common slip-plane under the influence of a given applied stress. The case of a set of free dislocations piled up against a fixed dislocation by a constant applied stress is discussed in detail and the resulting stress-distribution is compared with that produced by a crack with freely slipping surfaces. 16 ref. (Q24)

296-Q. The Use of Plasticine Models to Simulate the Plastic Flow of Metals. A. P. Green. *Philosophical Magazine,* ser. 7, v. 42, Apr. 1951, p. 365-373.

The behavior of plasticine when permanently deformed was compared with that of an ideal metal, and necessary conditions for similarity between their flow patterns were examined for flow in two and three dimensions. Processes thus examined were extrusion through square and wedge-shaped dies; indentation of a plane surface by a single wedge

and by a row of wedges; and compression of a narrow wedge by a flat die. Profile of a deep narrow block after a small indentation by a flat punch was also compared with theory. Compression of a narrow Cu wedge by a smooth flat die resulted in similar deformation to that of plasticine wedge. (Q24)

297-Q. A Theory of the Plastic Distortion of a Polycrystalline Aggregate Under Combined Stresses. J. F. W. Bishop and R. Hill. *Philosophical Magazine*, ser. 7, v. 42, Apr. 1951, p. 414-427.

A general relationship between stress and plastic strain in a polycrystalline aggregate is derived for any metal in which individual crystals deform by slipping over preferred planes under a critical shear stress. Shows that a plastic potential exists which is identical with the yield function. Upper and lower limits are obtained for approximate calculation of this function for any applied system of combined stresses. 13 ref. (Q24)

298-Q. Microscopical Examination of Creep Specimens. E. A. Jenkinson. *Engineer*, v. 191, Apr. 13, 1951, p. 469-472.

Forms an Appendix to "Fracture Under Combined Stress Creep Conditions of a 0.5% Mo Steel," by A. E. Johnson and N. E. Frost (Apr. 6 issue; see item 255-Q). 22 photomicrographs show structures before and after test. (Q3, M27, AY)

299-Q. The Effect of Copper, Silicon and Magnesium on the Mechanical Properties of Aluminium Alloys of the D.T.D. 424 Type. E. Scheuer, S. J. Williams, and J. Wood. *Journal of the Institute of Metals*, v. 79, Apr. 1951, p. 57-72.

Ultimate tensile stress, proof stress, elongation, and Brinell hardness of 81 alloys were determined and recorded in contour diagrams based on the ternary diagram for Al-Cu-Si alloys. The investigation included alloys with four different Mg contents (0.00, 0.08, 0.15, 0.25%). Graphs are also given showing effect of varying either Cu or Si content while keeping the other constituents constant. (Q27, Q29, Al)

300-Q. Some New Observations on the Mechanism of Fatigue in Metals. W. A. Wood and A. K. Head. *Journal of the Institute of Metals*, v. 79, Apr. 1951, p. 89-102.

Response of the crystalline structure of a metal to static stressing was compared by X-ray diffraction methods with its response to cyclic or fatigue stressing. Degree of suppression is shown to depend in part on the alternating character of deformation under cyclic stress. There appears to be a critical rate above which suppression of disorientation sets in abruptly. Experimental work was done mainly with Cu, plus some tests on Al. (Q7)

301-Q. Testing the Metal or the Casting. J. W. Bolton. *Foundry Trade Journal*, v. 90, Apr. 12, 1951. p. 389-390, 393.

Critically discusses recent paper of above title by E. O. Lissell (see item 568-Q, 1950). Indicates that neither the data nor the conclusions provide a sound solution of the broad problem proposed. Emphasis is on ferrous castings.
(Q general, S22, CI)

302-Q. New Possibilities of Measuring Stresses With Short X-Rays. (In German.) Hermann Möller. *Archiv für das Eisenhüttenwessen*, v. 22, Mar.-Apr. 1951, p. 137-142.

Method based on determining lattice constants of the elastically stressed test specimen in different directions and obliquely to the surface. The method is limited to measuring states of stress to a depth of 0.01-0.02 mm., provided elastic constant of the material is known. Includes X-ray pictures, graphs, tables, and photographs. 11 ref. (Q25)

303-Q. Testing the Sensitivity of Weldable Structural Steels to Brittle Fracture. (In German.) Erich Folkhard. *Stahl und Eisen*, v. 71, Mar. 29, 1951, p. 347-351.

Effect of welding on sensitivity to brittle fracture. Includes a critical study of the validity of different testing methods. (Q23, K9, CN)

304-Q. Special Features in the Change of Crystal Structure of a Metal During Deformation in Surface-Active Media. (In Russian.) V. N. Pozhanskii, T. A. Amfiteatrova, and P. A. Rebinder. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 76, Feb. 11, 1951, p. 697-698.

Kinetics of plastic deformation of a Cu wire in surface-active and inactive media was studied. Data indicate that the effect of surface-active agents in minimizing metal deformation of wire 0.05 mm. in diam. is at a maximum for a grain size of 0.09 mm. Method of investigation. (Q24, Cu)

305-Q. Statitron Will Workharden Aluminum Alloys, Build Forces to Cause Failure, Harden Non-Heat-Treatable Metals, Alter Physical Properties of Metals Instantly. Frank Charity. *American Machinist*, v. 95, May 14, 1951, p. 134-135.

The Statitron is a midget version of the Van de Graff electrostatic generator. It is an electromechanical

device, intended to convert ordinary electrical current into a high-voltage electron beam which is similar in output to the X-ray machine, except that it has the intensity necessary to alter the physical properties of metallic materials. Use for engineering tests to determine stresses that cause material failures. Diagram shows features of construction. (Q25, S13, J general)

306-Q. Armor Plate Resistance; The Terminal Properties of Small-Arms Projectiles. H. F. Kohlbacker. *Ordnance,* v. 35, May-June 1951, p. 632-635.

Deals primarily with projectiles between .22 and .50 caliber. Correlation of experimental results obtained during long research in the field of projectile behavior and phenomena against hard targets. Alloy and mild steel armor plate were tested. (Q6, T2, CN, AY)

307-Q. Residual Stresses Can Increase Fatigue Strength. *SAE Journal,* v. 59, May 1951, p. 38-40. (Based on "Stresses Imposed by Processing," by O. J. Horger.)

Recent investigations indicate that certain states of residual stress improve the fatigue strength of production parts. This new concept has completely changed the designer's point of view. Attention is now given to retaining thermal and transformation stresses rather than relieving them. Experimental data on SAE 1050 steel, supporting this concept. (Q7, Q25, CN)

308-Q. Distribution of Locked-In Stresses in a Large Welded Steel Box Girder. D. Rosenthal. *Welding Journal,* v. 30, May 1951, p. 250s.

Discusses paper by John Vasta. (Sept. 1950 issue; item 651-Q, 1950.) (Q25, CN)

309-Q. The Micro-Mechanism of Fracture in the Tension-Impact Test. *Welding Journal,* v. 30, May 1951, p. 255s-259s.

Several individuals discuss separately above paper by W. H. Bruckner. (Sept. 1950 issue; item 649-Q, 1950.) Includes author's reply. (Q27, ST, Fe)

310-Q. Room Temperature Tensile Tests an Index of Transition Temperature of Steel Plates. *Welding Journal,* v. 30, May 1951, p. 259s.

C. F. Tipper discusses above paper by S. S. Tor, R. D. Stout, and B. G. Johnston. (Sept. 1950 issue; item 650-Q, 1950.) (Q27, ST)

311-Q. Scatter in Transition Test Curves. Adrienne F. Scotchbrook, Bruce G. Johnston, and Robert D. Stout. *Welding Journal,* v. 30, May 1951, p. 266s-271s.

Construction of transition-temperature curves of steels requires a knowledge of testing-temperature interval, number of tests at each temperature, and reproducibility of measurements as well as a basis for indicating the transition temperature. (Q23, ST)

312-Q. The Determination of Initial Stresses and Results of Tests on Steel Plates. *Welding Journal,* v. 30, May 1951, p. 272s.

Discusses above paper by E. W. Suppiger, C. Riparbelli, and E. R. Ward. (Feb. 1951 issue; see item 96-Q, 1951.) (Q25, CN)

313-Q. Hardness Testing. H. Schulz. *Microtecnic* (English Ed.), v. 5, Jan.-Feb. 1951, p. 6-9. (Translated from the German.)

Fundamental principles. Compares results obtained by different methods on different materials. (Q29)

314-Q. Bergsman Method for Hardness Testing. *Microtecnic* (English Ed.), v. 5, Jan.-Feb. 1951, p. 28-30.

Swiss-made microhardness testing equipment in assembly with a metallurgical microscope. (Q29)

315-Q. Influence of Impurities on the Form of Tensile Curves. (In French.) Bernard Jaoul. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Feb. 12, 1951, p. 595-596.

Particularly additions capable of forming solid solutions with Al, such as Zr, Mn, W, Si, and Cu. Data are charted. (Q27, Al)

316-Q. Remark Concerning Determination of the Point of Origin of Fracture During Tensile Testing of Mild Steel. (In French.) Georges A. Homes and Jacques Goudzou. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Feb. 12, 1951, p. 596-598.

Experimental proof of the hypothesis that the above point is located in the interior of the test specimen, the fracture progressing from the inside toward the periphery of the specimens. Includes micrographs. (Q27, CN)

317-Q. Creep Resistance of Malleable Aluminum Alloys. (In German.) H. Vosskühler. *Metall,* v. 5, Apr. 1951, p. 135-141.

Experimentally established data. Effect of test temperature and alloy composition on creep resistance. 12 ref. (Q3, Al)

318-Q. Some Quantitative Data Bearing on the Scabbing of Metals Under Explosive Attack. John S. Rinehart. *Journal of Applied Physics,* v. 22, May 1951, p. 555-560.

Fracturing, or scabbing, of a material near a free surface as the re-

sult of a transient compressional stress wave of high intensity impinging on that surface has been observed for many years. The phenomenon was investigated for 1020 steel, 4130 steel, 24S-T4 alloy, brass, and Cu, using an explosive charge to induce a high-intensity stress wave in the metal. Distribution of pressure within the wave was determined by a modified Hopkinson-bar type of experiment. Scabbing was found to be governed principally by spatial distribution of pressure within the wave and a critical normal fracture stress characteristics of the material and perhaps the state of stress. (Q28, CN, AY, Al, Cu)

319-Q. Internal Friction of Ferromagnetic Materials. A. Ferro and G. Montalenti. *Journal of Applied Physics,* v. 22, May 1951, p. 565-568.

Attempts to verify experimentally the following hypothesis in cyclically stressed ferromagnetic materials, energy loss because of magnetoelastic internal friction is induced by a domain motion due to the applied stress itself. Results appear to confirm the assumptions. Materials tested were 99.5% Ni and several steels. 10 ref.
(Q22, P16, ST, Ni, SG-n, p)

320-Q. The Plastic Deformation of Pure Single Crystals of Lead and Copper. Peter W. Neurath and James S. Koehler. *Journal of Applied Physics,* v. 22, May 1951, p. 621-626.

Single crystals of 99.999% pure Pb and Cu were grown by the Bridgman method. A tensile-creep apparatus is used. Measurements on Cu at 23 and −190° C. show that for resolved shearing stresses below 0.6 kg. per sq. mm., steady-state creep rate is negligible. Measurements were also made of the steady-state creep of Pb at 25 and 110° C. Results produced by annealing were investigated. (Q24, Pb, Cu)

321-Q. Friction at High Sliding Velocities of Oxide Films on Steel Surfaces Boundary-Lubricated With Stearic-Acid Solutions. Robert L. Johnson, Marshall B. Peterson, and Max A. Swikert. *National Advisory Committee for Aeronautics,* Technical Note 2366, May 1951, 35 pages.

Efficacy of prepared oxide films in this type of lubrication. 18 ref. (Q9, ST)

322-Q. The Strength of Tubes Subjected to Internal Pressure at Very High Temperatures. (In German.) Max Pfender. *Brennstoff-Wärme-Kraft,* v. 3, May 1951, p. 141-143.

Effects of pressure, temperature, and time on deformation and stress conditions in internally stressed steel tubes. Shows that, at temperatures exceeding 525° C., even highly alloyed steels are subject to permanent creep. (Q3)

323-Q. Transverse Properties of Bars of Various Cross-Sections. G. N. J. Gilbert. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Apr. 1951, p. 811-859.

Various shaped test bars were used, all having the same thickness of flange and web and the same cross-sectional area. Results indicate that there is no simple relationship connecting transverse strength and modulus of elasticity with a constant of the section. However, for the sections examined, there was a tendency for transverse rupture stress to decrease with increase of the modulus of section, and for modulus of elasticity to decrease with increase of moment of inertia of the section. Constants were obtained comparing transverse rupture stress and modulus of elasticity of the various sections with a round bar of the same material. From consideration of conditions for equilibrium in a beam under load, a method was developed by which strength of a cast iron of any section shape can be found. (Q27, CI)

324-Q. Comprehensive Mechanical Tests of Two Pearlitic Grey Irons. J. W. Grant. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Apr. 1951, p. 861-875.

Results of a series of tests on irons having nominal tensile strengths of 19 and 22 tons per sq. in., respectively. The tests included transverse, tensile, hardness, impact, shear, torsion, damping capacity, compression, fatigue, electrical resistivity, density, and coefficient of expansion. (Q general P general, CI)

325-Q. Testing and Computation of Static Tensile-Shear Load of Spot-Welded Joints. H. Zschokke and R. Montadon. *Brown Boveri Review,* v. 37, Aug.-Sept. 1950, p. 318-335.

See abstract under similar title from *Engineers' Digest,* item 207-Q, 1951.
(Q2, Q27, K3, CN, SS, Al)

326-Q. Slip and Polygonization in Aluminium. R. W. Cahn. *Journal of the Institute of Metals,* v. 79, May 1951, p. 129-158.

Method for making Al crystals of predetermined orientation from the melt. Development of slip lines during stretching of these crystals was studied in detail, with particular reference to cross slip (localized slip on planes other than the main octahedral plane subject to maximum

shear stress) and to deformation bands. Possible reasons for occurrence of bands. 44 ref. (Q24, Al)

327-Q. Three Basic Stages in the Mechanism of Deformation of Metals at Different Temperatures and Strain-Rates. W. A. Wood, G. R. Wilms, and W. A. Rachinger. *Journal of the Institute of Metals,* v. 79, May 1951, p. 159-172.

As temperature of deformation of Al is increased, or as rate of strain at any one temperature is decreased, the mechanism of slip is replaced by a second mechanism termed "cell mechanism". By further reduction in strain-rate at an elevated temperature, the cell mechanism is in turn superseded; this occurs when the cells become comparable in size with the grain itself. This third stage is termed "boundary microflow". Implications in relation to the mechanism of deformation, strain-hardening, and creep. 14 ref. (Q24, Al)

328-Q. The Evaluation of Macroscopic Residual Stresses in Cylindrical Bars. H. Föppl. *Journal of the Iron and Steel Institute,* v. 168, May 1951, p. 15-23.

Theories of stress reversal are confirmed by results calculated from new equations. These results are compared with those calculated from Heyn's and Sachs' equations. Shows that all the stresses can be calculated accurately, even if the strains are measured in only one direction. 24 ref. (Q25)

329-Q. The Role of Alloying Elements in Steel. (In French.) B. Hedde d'Entremont. *Métallurgie et là Construction Mécanique,* v. 82, Nov. 1950, p. 859, 861-863, 865, 867.

The influence of principal alloying elements on the properties of steel. Includes phase diagrams and photomicrographs. (To be continued.) (Q general, M27, AY)

330-Q. Microhardness and Type of Bonding. (In German.) R. Mitsche and E. M. Onitsch. *Mikrochemie vereinigt mit Mikrochimica Acta,* v. 36-37, pt. 2, Jan. 4, 1951, p. 841-862; disc. p. 860-861.

General discussion and specific examples for a wide variety of metallic and nonmetallic materials. Shows that microdetermination of hardness may be applied to identification of materials of any type of bonding. 26 ref. (Q29)

331-Q. Some Practical and Theoretical Problems in Microhardness Testing. (In German.) E. B. Bergsman. *Mikrochemie vereinigt mit Mikrochimica Acta,* v. 36-37, pt. 2, Jan. 4, 1951, p. 831-840.

Discussion is clarified by graphs and photomicrographs. Emphasizes work on metals. 21 ref. (Q29)

332-Q. The Influence of Surface Roughness on the Fatigue Life and Scatter of Test Results of Two Steels. P. G. Fluck. *American Society for Testing Materials,* Preprint 20, 1951, 8 pages.

Results of tests on fatigue specimens of SAE 1035 and 3130 steels prepared by six different methods of surface finishing. The tests show a marked increase in fatigue life—as much as tenfold—due to polishing of the lathe-formed specimens. Groups of 12 similar specimens were tested to provide information on scatter or dispersion of test results. (Q7, CN, AY)

333-Q. Fatigue Problems in Transport Aircraft. William T. Shuler. *Aeronautical Engineering Review,* v. 10, June 1951, p. 20-26.

Facts concerning operating time of modern transport aircraft and incidence of fatigue-type failures in airframes. Civil Air and International Regulations pertaining to fatigue and the administration of these regulations. Some types of fatigue problems occurring in service and corrective and preventive measures taken. (Q7)

334-Q. The Influence of Frequency on the Repeated Bending Life of Acid Lead. John F. Eckel. *American Society for Testing Materials,* Preprint 25, 1951, 12 pages.

A test for Pb strip that utilizes a new type of specimen and a new type of grip. Shows that a definite relationship exists between frequency and the bending life of acid Pb between 0.27 and 0.65% maximum strain per cycle and between 6.63 and 7440 cycles per day. Extrapolation gives an indicated bending life at 1 cycle per day shorter than found in service. (Q5, Pb)

335-Q. Notch-Toughness of Fully Hardened and Tempered Low-Alloy Steels. R. L. Rickett and J. M. Hodge. *American Society for Testing Materials,* Preprint 31, 1951, 14 pages.

Notch-toughness of several low-alloy steels quenched entirely to martensite and then tempered was measured by means of Charpy keyhole-notch impact tests. In general, low-carbon steels were found to be tougher than higher-carbon steels, when the latter were tempered at some higher temperature to produce the same hardness. The tendency for notch-toughness to decrease on tempering at about 600° F. was confirmed. Concludes that the presence of retained austenite probably is not

responsible for loss of toughness on tempering at 600° F. (Q6, AY)

336-Q. The Creep Properties of Some Forged and Cast Aluminum Alloys. O. D. Sherby, T. E. Tietz, and J. E. Dorn. *American Society for Testing Materials,* Preprint 33, 1951, 13 pages.

Creep properties of the following Al alloys were obtained for 90, 212, 300, and 400° F. up to 1000 hr. rupture time: B18S-T61, 18S-T61, A51S-T6 forgings; 355-T71, A132-T551, 333-T533 permanent-mold castings; and 355-T71, 142-T77, A355-T51 sand castings. (Q3, Al)

337-Q. Creep Properties of Two Tempers of 63S Extruded Aluminum Alloy. O. D. Sherby and J. E. Dorn. *American Society for Testing Materials,* Preprint 34, 1951, 9 pages.

Creep properties of 63S extruded Al alloy in the T5 and T6 tempers were obtained at 90, 212, 300, and 400° F. up to 1000 hr. rupture time. (Q3, Al)

338-Q. Prediction of Relaxation of Metals From Creep Data. Irving Roberts. *American Society for Testing Materials,* Preprint 37, 1951, 15 pages.

Controversy over evidence that relaxation rates of metals can be predicted from tension-creep data by means of the strain hardening assumption. A theoretical discussion which should help to clarify some of the confusion. Experimental data show that the strain hardening assumption yields accurate results not only for Cu, but also for carbon steel, and for the alloy S-816. 14 ref. (Q3)

339-Q. Cerium Increases Use of Wrought Stainless. *Iron Age,* v. 167, June 7, 1951, p. 106.

Certain "difficult-to-work" high-alloy, corrosion resistant and heat resistant steels can now be readily hot worked. The application, developed by Carpenter Steel Co., involves addition of small amounts of Ce. (Q23, SS, SG-g, h)

340-Q. Branching of Slip Lines in Alpha-Brass. Harry Czyzewski. *Journal of Applied Physics,* v. 22, June 1951, p. 846.

Some observations of slip that occurred in a specimen of alpha brass containing annealing twins. Includes electron micrograph. (Q24, Cu)

341-Q. Properties Influencing Wear of Metals. T. L. Oberle. *Journal of Metals,* v. 3, June 1951, p. 438-439G.

Factors influencing wear of metals, and also methods for reducing or eliminating this type of waste. 59 ref. (Q9)

342-Q. Deformation Texture of Cold-Drawn Copper Wire. Walter R. Hibbard, Jr. *Journal of Metals,* v. 3, June 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 467.

Discusses recent communication by W. A. Backofen (Mar. 1951 issue; item 159-Q, 1951). Shows that correct analysis indicates complete agreement with Hibbard's results. (Q24, Cu)

343-Q. A Study of Fatigue in Metals by Means of X-Ray Strain Measurement. John A. Bennett. *Journal of Research of the National Bureau of Standards,* v. 46, June 1951, p. 457-461.

X-ray determinations of lattice strain were made on steel specimens under a series of static bending moments, using specimens as normalized and after various amounts of fatigue stressing. Slope of the line relating bending moment to lattice strain was found to decrease with increasing numbers of cycles of alternating stress. However, the decrease was of approximately the same magnitude for specimens stressed above and below the fatigue limit, showing that the change was not associated with fatigue damage. (Q7, ST)

344-Q. Effect of Chromium Plating on the Plastic Deformation of SAE 4130 Steel. Hugh L. Logan. *Journal of Research of the National Bureau of Standards,* v. 46, June 1951, p. 472-479.

Effects were evaluated from results of tensile impact, bending, and crushing tests. Cr plating materially reduces percentage of elongation, true stress at beginning of fracture, and ratio of original cross-sectional area to area at beginning of fracture. Values of these properties decreased with increased plating thickness. (Q23, L17, AY, Cr)

345-Q. New Cerium Bearing Alloy Steels Offer Greater Hot Ductility. *Steel,* v. 128, June 4, 1951, p. 98.

Improved properties of Carpenter No. 20, a Ce-containing steel developed by Carpenter Steel Co., Reading, Pa. (Q23, AY)

346-Q. Brittle Coating for Stress Analysis. Greer Ellis. *Tool Engineer,* v. 26, June 1951, p. 35-37.

Procedure, and several case histories. (Q25)

347-Q. Measurement of the Curvature of Stress Trajectories in Photoelastic Models. A. F. C. Brown. *British Journal of Applied Physics,* v. 2, May 1951, p. 138-140.

Use of Jessop's extension of the Lamé-Maxwell equations for separating the principal stresses in a three-dimensional photo-elastic problem depends for its accuracy on a precise knowledge of the curvature of the stress trajectories crossing

the line along which the integration process is carried out. A method of measuring these curvatures more accurately, and an example of application of the method to a particular frozen-stress problem. (Q25)

348-Q. The Fatigue Crack as a Stress-Raiser. A. J. Fenner, N. B. Owen, and C. E. Phillips. *Engineering*, v. 171, May 25, 1951, p. 637-638. (A condensation.)

V-notched test pieces of mild steel cut from 3-in. bars were subjected to alternating stress cycles in a 60-ton Schenck machine while being continuously inspected by a magnetic method. The samples were sectioned and examined microscopically following the test period. It was concluded that, under certain conditions, it is possible to initiate a fatigue crack which fails to develop beyond a certain point, though the cyclic conditions of loading remain unchanged. This appears to require an initial stress-concentration factor of a fairly high order, but it is believed that the effect of a fatigue crack, considered as a stress-raiser, may be less severe, in certain cases, than that of the original artificial notch. (Q7, CN)

349-Q. Stress Raisers in Fatigue. R. C. A. Thurston. *Canadian Mining and Metallurgical Bulletin*, v. 44, May 1951, p. 347-354; disc., p. 354-355.

Deleterious effect of notches on the resistance to fatigue of machine components. Graphs show theoretical stress concentration factors for shafts with circular-arc fillets in bending and in torsion. Effect of shot peening, cold rolling, and other operations. Surface finishes and corrosion are shown to affect fatigue resistance. 18 ref. (Q7, G23)

350-Q. Generalization of the Portevin-Le Chatelier Phenomenon on the Basis of Tensile-Test Curves of Light Alloys. (In French.) Aurel Berghezan. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, Mar. 5, 1951, p. 975-977.

Results of investigation show to what extent the kinetics of the above hardening phenomenon can be influenced either by rate of quenching or by additions to the binary solid solution. Experimental investigation on an Al+4% Cu alloy shows possibilities of application to other solid solutions of Al, such as Al-Mg and Al-Zn. (Q27, N7, Al)

351-Q. Displacement of Crystals in a Progressively Rolled Aluminum Monocrystal. (In French.) Raymond Jacquesson and Jack Manenc. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, Mar. 5, 1951, p. 977-979.

Study was made to generalize results of an earlier investigation indicating that the crystallites resulting from dislocation of the crystal suffer the same displacements as the elements of an isotropic medium, submitted to the same deformation. Variation of crystalline structure in Al sheet, initially monocrystalline and successively reduced by rolling, were studied. (Q24, Al)

352-Q. Internal Friction of Molten Gold-Silver Alloys. (In German.) Erich Gebhardt and Manfred Becker. *Zeitschrift für Metallkunde*, v. 42, Apr. 1951, p. 111-117.

Apparatus and procedure for measuring internal friction of molten metals at high temperatures in the absence of air and for determining the correlation between damping and internal friction. 36 ref. (Q22, Au, Ag)

353-Q. Spontaneous Expansion. (In German.) Werner Engelhardt. *Zeitschrift für Metallkunde*, v. 42, Apr. 1951, p. 117-119.

Magnitude and frequency of local stresses at grain boundaries. There are so many possible deviations from the ideal lattice and, thus, a stress-raising effect of position that, as a first approximation, a Gaussian distribution of these effects can be assumed. 11 ref. (Q25)

354-Q. Determination of Stress and Value of Lattice Constants for the Stress-Free State From an X-Ray Back-Reflection Photograph. (In German.) Richard Glocker. *Zeitschrift für Metallkunde*, v. 42, Apr. 1951, p. 122-124.

A general formula for determining the direction in which—in X-ray stress measurements—the expansion becomes zero; also a process of determining from half of the film the stress and from the other half the lattice constant for the unstressed state. The process can always be applied to mono-axial stress conditions and in special cases, to biaxial stress conditions. (Q25, M26)

355-Q. Dynamic Tensile Tests. (In Italian.) F. Gatto. *Alluminio*, v. 20, No. 1, 1951, p. 17-22.

A new method for determining strain-deformation curves during dynamic tests. The proposed method is not subject to increase in error with speed of the test, as is the case with methods hitherto used. It is therefore particularly suitable for tests of very short duration. (Q27)

356-Q. Variation of the No. 1 Band in Polotoelastic Materials Under Tensile Stress. (In Italian.) W. Ruff. *Alluminio*, v. 20, No. 1, 1951, p. 23-28.

Re-examines research done by Rossi in 1910. The tests showed that at present the only photo-elastic material made in the U. S. has negligible variations in the No. 1 band. Neither the German Dekorit V300, nor the English Catalin 800 give satisfactory results in this respect. 21 ref. (Q27)

357-Q. How Titanium Behaves at Temperatures to 900° F. W. Lee Williams. *Iron Age,* v. 167, June 14, 1951, p. 81-84.

Light weight and erosion resistance make Ti a natural for steam-turbine blades. Although the best properties are found in Ti-base alloys, this study shows how commercially pure Ti can be expected to behave in above temperature range. Mechanical properties are tabulated, charted, and discussed. (Q general, Ti)

358-Q. The Propagation of Longitudinal Waves of Plastic Deformation in a Bar of Material Exhibiting a Strain-Rate Effect. L. E. Malvern. *Journal of Applied Mechanics,* v. 18, June 1951; *Transactions of the American Society of Mechanical Engineers,* v. 73, 1951, p. 203-208.

The theory of propagation of longitudinal waves of plastic deformation is extended to apply to materials in which stress is a function of instantaneous plastic strain and strain rate. Solutions are given for an idealized flow law and compared with solutions based upon earlier theories which neglect strain-rate effect. 30 ref. (Q24)

359-Q. Engineering Steels Under Combined Cyclic and Static Stresses. *Journal of Applied Mechanics,* v. 18, June 1951; *Transactions of the American Society of Mechanical Engineers,* v. 73, 1951, p. 211-216.

Several contributors discuss above paper by H. J. Gough (June 1950 issue; see item 415-Q, 1950). Includes author's closure. (Q1, Q5, CN)

360-Q. Transient Creep in Pure Metals. O. H. Wyatt. *Nature,* v. 167, May 26, 1951, p. 866.

When an annealed pure metal is loaded beyond the yield point, deformation continues after the load is applied. At constant stress Andrade has shown that the creep curve consists of strain on loading, followed by decelerating or transient creep, and finally steady-rate creep. Two different equations have been suggested for the transient creep curve. Measurements were made with Cu, Al, and Cd between —196 and 170° C., for a wide range of stresses. It was found that one equation (logarithmic) fits at low-temperatures and another (exponential) at high temperatures, with a composite equation fitting the intermediate range. 10 ref. (Q3, Cu, Al, Cd)

361-Q. Residual Stresses in Butt-Welded Joints in Pipe Lines. (In Russian.) M. P. Anuchkin. *Avtogennoe Delo* (Welding), v. 22, Jan. 1951, p. 11-14.

Experimentally investigated on steel pipes 325 mm. in diam. having wall thickness of 10 mm. Diagrams show stress values and their distribution. (Q25, K general)

362-Q. (Book) **Contribution a l'Etude des Réactions Mutuelles des Cristaux dans la Déformation des Métaux Polycristallins.** (Contribution to the Study of Mutual Reactions of Crystals in the Deformation of Polycrystalline Metals.) Ed. I. 98 pages. 1950. Publications Scientifiques et Techniques du Ministere de l'Air, 2 rue de la Porte d'Issy, Paris, France. 500 fr.

An investigation of the plastic deformation of polycrystalline metals. Experiments were performed on specimens of Al consisting of single crystals, bi-crystals, and coarse polycrystals, and modes of deformation within the crystals and near the crystal boundaries were studied by means of X-rays, using both the Laue method and a divergent-beam method developed by Guinier. The main conclusion is that the boundary between adjoining crystals does not exert a direct influence of its own upon mode of deformation; it is regarded instead as a frontier across which the crystals interfere with each other. (Q24, Al)

363-Q. Observations of the Effect of Time on Physical Properties of Small Tanks. T. L. White. *American Society for Mechanical Engineers,* Paper 50-PET-26, 1950, 15 pages.

Numerous tests made over a period of years on spherical vessels, each composed of two hemispheres, show changes in physical properties of the steel over a period of time. The hemispheres are designed to store liquefied-petroleum gas at atmospheric temperatures. They were all cold formed, welded, and hydrostatically tested in a similar manner. They were made of openhearth semi-killed flange quality steel conforming to ASME Specification Sa-285, grade C. (Q general, CN)

364-Q. An Arbitration Bar Izod Impact Test for Cast Iron. J. T. Eash and A. P. Gagnebin. *American Society for Testing Materials,* Preprint 15, 1951, 8 pages.

An impact test for cast iron consisting of breaking a section of an

unmachined bar in a modified Izod machine. Dimensional constants of the machine. Illustrative data show that the system accommodates various types of cast iron with impact values ranging from 10 ft-lb. for high-phosphorus gray irons to over 120 ft-lb. for austenitic cast irons. (Q6, CI)

365-Q. Planning and Interpretation of Fatigue Tests. Alfred M. Freudenthal. *American Society for Testing Materials,* Preprint 16, 1951, 11 pages.

Significance of the scatter of results of fatigue tests and inadequacy of conventional procedures for their planning and interpretation. An attempt is made to derive the cumulative frequency distribution function of fatigue life, at any particular stress amplitude, from considerations of statistical theory. Results of rotating-beam and reversed torsion-fatigue tests on steel, Al, and Cu are shown to approximate the theoretically derived distribution. 15 ref. (Q7)

366-Q. Effect of Residual Stress on the Fatigue Strength of Notched Specimens. D. Rosenthal and G. Sines. *American Society for Testing Materials,* Preprint 17, 1951, 16 pages.

Previous investigations have established that residual stress definitely affects fatigue strength of metal parts, but no quantitative relations have been derived to predict actual performance. An attempt was made to overcome two of the major obstacles: the presence of other factors and partial relief of residual stress. Tests were performed on notched 61S Al alloy. Residual stress, both compressive and tensile, was set up at the base of the notch by a process of overstressing which created only negligible cold working, and an X-ray stress technique was used to follow change of residual stress during testing. (Q7, Q25, Al)

367-Q. Fatigue Strength of Ball Bearing Races and Heat-Treated 52100 Steel Specimens. Haakon Styri. *American Society for Testing Materials,* Preprint 23, 1951, 15 pages.

Failures of ball bearings by spalling or flaking usually start from points below the contacting surfaces, and considerable variation of heat treatment has little influence on the scatter. Tests were run on ring-type, rotating-beam-type, Krouse-type, and torsion-type specimens. Concludes that the fatigue failures in bearings start at local weakness points in a region under the rolling contact path where shear stresses are high. 15 ref. (Q7, AY)

368-Q. The Fatigue Tests as Applied to Lead Cable Sheath. G. R. Gohn and W. C. Ellis. *American Society for Testing Materials,* Preprint 24, 1951, 20 pages.

Important factors affecting the design of laboratory test methods suitable for obtaining significant fatigue data from reversed bending tests on cantilever-beam specimens of Pb cable-sheathing alloys. Effect of cycling rate, temperature, shape of specimen, alloy additions, and aging on fatigue life. Fatigue data in terms of cycle life vs. deflection, cycle life vs. strain, and cycle life vs. stress. 21 ref. (Q7, Pb)

369-Q. Compression Tests on Lead Alloys at Extrusion Temperatures. G. M. Bouton and G. S. Phipps. *American Society for Testing Materials,* Preprint 26, 1951, 10 pages.

Load-deflection measurements made during compression tests on Pb and Pb alloy cylinders at various temperatures show effects of alloying ingredients on force required to produce deformation. The curves also furnish clues as to changes taking place in the materials during the test. Elements added to Pb were those most commonly used in the manufacture of cable sheath, namely, Sb, As, Bi, Ag, Te, and Sn. Results show that the stronger alloys now used in cable sheathing deform less readily at extrusion temperatures than pure Pb or the weaker alloys. (Q28, Pb)

370-Q. Laboratory Evaluation of Materials for Marine Propulsion Gears. M. R. Gross. *American Society for Testing Materials,* Preprint 38, 1951, 16 pages.

Results of tests made to evaluate pitting resistance and root fatigue strength of materials for marine gears. By means of contact-roller test machines, pitting limits were determined for six steels and eight nonferrous materials. A new test called the "simulated gear-tooth fatigue test" was developed to evaluate root fatigue strength under reserved bending stresses. Effects of hardening treatments, root radii, and surface finish and treatments on endurance limit of the root area was determined for three steels. (Q7, T7)

371-Q. Rheotropic Brittleness; General Behavior. E. J. Ripling and W. M. Baldwin, Jr. *American Society for Testing Materials,* Preprint 39, 1951, 8 pages.

The brittle behavior of a metal with a hexagonal-type crystal structure (pure Zn) at temperatures less than the transition value was found to be largely strain curable (rheotropic). This suggested that rheotropism, heretofore reported only in

steels, is a general property of materials that show a transition temperature. Shows the low ductility of Zn at high strain rates to be rheotropic. Since the brittleness of notched steels was recently found to be rheotropic, it can be assumed that brittleness induced by any of the three known embrittling variables is strain-sensitive. (Q23, Zn)

372-Q. Report of Committee E-1 on Methods of Testing. J. R. Townsend, chairman. *American Society for Testing Materials,* Preprint 83, 1951, 71 pages.

Includes "Report on the Principles Involved in the Determination of Absolute Viscosity," by W. H. Markwood, Jr., editor, (70 ref.); methods for compression testing of metallic materials in sheet and other forms; proposed revision of tentative recommended practice for microscopic analysis of particle size distribution of subsieve size material; methods for softening point by ring-and-ball apparatus; and for tension testing of metallic materials. (Q general)

373-Q. Evaluation of the Anti-Wear Properties of Gear Greases. N. J. Ninos. *Institute Spokesman,* v. 15, June 1951, p. 8-9, 11-13, 15-18, 21-23, 25-27.

Work done using the Navy gear wear tester to evaluate the anti-wear characteristics of synthetic low-temperature greases for lubrication of brass-on-steel surfaces, and to supplement other bench-test data by employing metallic combinations of dissimilar metals in the form of gears. Based on statistical treatment a curve was developed which determined what significance can be attached to differences between wear rates of two different greases. Tabular data for Government Specification greases on brass-on-steel test pieces are included, as well as correlative data on phosphor bronze, 24S-T Al, and SAE 4130 steel. (Q9, Cu, ST, Al)

374-Q. Some Extensions of Elementary Plasticity Theory. F. Edelman and D. C. Drucker. *Journal of the Franklin Institute,* v. 251, June 1951, p. 581-605.

Detailed investigation of yield or loading criteria for work hardening materials, which lead to constant strain ratios under increasing stress when stress ratios are maintained constant. The experimenter is given a choice of incremental stress-strain theories with which results of simple or complicated combined loading tests may be correlated. Loading functions of isotropic as well as anisotropic types. Predicted results of some basic tests for several loading criteria. 10 ref. (Q23)

375-Q. Hydrogen Theory for Brittle Ship-Plate. Carl A. Zapffe. *Metal Progress,* v. 59, June 1951, p. 802-808.

History of the internal-cracking defect in steel known as "flaking" Use of fractography to study the general problem of ship-plate fracture. The H_2 theory of brittle ship plate and effects of this element on weld metal. 20 ref. (Q23, CN)

376-Q. Free Cone Bend Test. *Metal Progress,* v. 59, June 1951, p. 840, 842. (Condensed from "A Free Cone Bend Test for Aluminum Alloy Sheet and Coil", W. Thompson, Report A.I.D./MET/9, *Aeronautical Inspection Department,* Harefield, England.)

Procedure designed to determine the limiting radius of bend in a single operation. Since the region of the test piece undergoing deformation is not restrained, errors due to frictional effects, or local decreases in curvature, are eliminated. (Q5)

377-Q. Plastic Deformation of Chromium-Plated Steel for Aircraft. *Technical News Bulletin* (National Bureau of Standards), v. 35, June 1951, p. 79-80. (Condensed from article by Hugh L. Logan.)

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 344-Q, 1951. (Q24, L17, AY, Cr)

378-Q. Strain Aging of Pressure Vessel Steels. Helmut Thielsch. *Welding Journal,* v. 30, June 1951, p. 283s-290s.

Interpretation of strain aging in terms acceptable to the non-metallurgist. Effects of the steelmaking process, composition, heat treatment, fabrication, and welding. 45 ref. (Q25, CN)

379-Q. Interpretive Report, Fabrication Division, Pressure Vessel Research Committee. *Welding Journal,* v. 30, June 1951, p. 291s-302s.

A series of short discussions by different authors of above paper by H. C. Boardman. See item 647-Q, 1950. They are followed by the author's reply. (Q23, K general, T26, ST)

380-Q. Falling-Weight Impact Test of Welded Aluminum Alloy Plates. E. C. Hartmann. *Welding Journal,* v. 30, June 1951, p. 303s-306s.

A new test and equipment for comparing the resistance of welded plates to shock loadings at various temperatures. (Q6, K9, Al)

381-Q. The Influence of Biaxiality on Notch Brittleness. *Welding Journal,* v. 30, June 1951, p. 319s-320s.

Discussion of above paper by D. Rosenthal and W. D. Mitchell. See item 646-Q, 1950. Includes authors' reply. (Q23, CN)

382-Q. Brittle Lacquer Stress Analysis. R. H. Warring. *Machinery Lloyd* (Overseas Edition), v. 23, May 26, 1951, p. 76-79, 81, 83.

Equipment and procedures applied to different shapes. Types of lacquers, methods of use, and limitations. (Q25)

383-Q. Investigation of Cast Secondary Aluminium Alloys; Fatigue Tests. J. Wood. *Metal Industry,* v. 78, June 8, 1951, p. 459-462.

Results of an experimental program designed to determine the fatigue strength of Intal 305 and 308 in both the sand-cast and chill-cast conditions. For purposes of comparison, tests were also made on DTD 424. (Q7, Al)

384-Q. Photoelastic Laboratory at the National Physical Laboratory. A. F. C. Brown and V. M. Hickson. *Engineering,* v. 171, June 8, 1951, p. 701-704.

Detailed description of facilities. Aims of the section are twofold: to provide facilities for photoelastic stress analysis and to evaluate known methods, to improve them and to develop new methods. (Q25)

385-Q. Yield Phenomenon and Twinning in α-Iron. A. T. Churchman and A. H. Cottrell. *Nature,* v. 167, June 9, 1951, p. 943-945.

Relates the above phenomena, and gives results of experiments. (Q24, Fe)

386-Q. The Deformation and Aging of Mild Steel. W. Sylwestrowicz and E. O. Hall. *Proceedings of the Physical Society,* v. 64, sec. B, June 1, 1951, p. 495-502.

Mild steel deforms by a series of bands of plastic deformation called Lüders bands. In heavy tensile specimens, a complex series of bands may appear, but in thin wire specimens only single bands are formed. Measurements of propagation stress and Lüders strain for these single bands, and effects which occur on aging deformed specimens. Current theories of the upper yield point—the stress at which bands first appear. 16 ref. (Q24, CN)

387-Q. The Origins and Causes of Fractures in Some Types of Steels. (In Czech.) Vladimir Koselev. *Hutnické Listy,* v. 6, Mar. 1951, p. 106-110; Apr. 1951, p. 165-179.

Factors responsible. Defines real and apparent grains, pseudo-morphism, intercrystalline, fractures, etc. Various characteristic types of fractures with special reference to plane fracture and sorbitic and pearlitic steel fracture. Suggests that pearlitic steel fracture is influenced by extent and number of defective spots, represented by the boundary planes of the blocks of cementite as well as the pearlite-ferrite boundaries. (Q26, ST)

388-Q. Determination of Residual Stresses in a Case-Hardened Steel Cylinder. (In French.) Jacques Pomey, Louis Abel, and Pierre Yenin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Apr. 30, 1951, p. 1641-1643.

Investigation, particularly of the development of stresses during tempering. It was found that the carburized layer is hardened during bainitic isothermal transformation of the core, so that the stresses due to martensite transformation are predominant. Method for determination of such stresses. Equations are interpreted for different values of the variables. (Q25, N8, J29, ST)

389-Q. Study of Fatigue Strength of Welded Structures. (Continued.) (In French.) W. Soete and R. Van Crombrugge. *Revue de la Soudure: Lastijdschrift,* v. 6, No. 4, 1950, p. 199-212.

Low-carbon structural-steel test specimens were used. Types of fracture of welds under static and fatigue stress; tests for determination of fatigue characteristics; and influence of type of electrodes used on strength of welds. (Q7, K9, CN)

390-Q. Mechanical Strength of Silver-Brazed Joints. (In French.) C. D. Coxe and A. M. Setapen. *Revue de la Soudure; Lastijdschrift,* v. 6, No. 4, 1950, p. 213-219.

Static-impact and fatigue properties of brazed joints in Armco iron and in several types of steel. Factors influencing these properties, such as strength of the base metal, flux inclusions, and joint design. (Q6, Q7, K9, ST, Fe)

391-Q. Basic Conclusions From the Contact-Hydrodynamic Theory of Lubrication. (In Russian.) A. I. Petrusevich. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Feb. 1951, p. 209-223.

Applicability of the theory in developing an exact mechanism of contact strength and liquid friction, as well as wear and seizing of metals; in correlating various experimental data with a single theory of contact strength and contact-liquid friction; in planning further research on these problems; in developing simpler methods of testing materials, lubricants, and lubricant additives; and in designing new machine parts in the light of these concepts. (Q9)

392-Q. The Strength of Tubes Under Internal Pressure at High Tempera-

tures. E. Siebel and S. Schwaigerer. *Engineers' Digest*, v. 12, June 1951, p. 196-198. (Translated and condensed from *Brennstoff-Wärme-Kraft*, v. 3, May 1951, p. 141-143.)

Stress formulas are developed and examples given for plain carbon and alloy steel tubes. (Q23, CN, AY)

393-Q. Properties of Materials and Engineering Uses of Cast Metals. R. W. Bailey. *Foundry Trade Journal*, v. 90, June 14, 1951, p. 629-636, 641.

Edward Williams Lecture. The question of tensile strength; influence of forging on cast steel; use of Mn-Al brass retaining rings for single-phase turbo-alternators; use of castings at elevated temperatures; cast iron crankshafts; fatigue-testing equipment; spheroidal-graphite cast iron; and the lost-wax process. (Q general, E general, CI, Cu)

394-Q. Temperature and Stress Rate Affect Fractology of Ferritic Stainless. C. A. Zapffe and C. O. Worden. *Iron Age*, v. 167, June 28, 1951, p. 65-69.

Shows that temperature and velocity of fracture are counteracting factors in the fractographic structure of stainless types 430 and 446. Under hammer-blows, these steels show transition to slip-type patterns between 35 and 100° C. Fracture by rifle shot produces identical patterns, but the transition temperature is 150° C. higher. Includes 14 fractographs. (Q26, SS)

395-Q. Effect of Hardness on Temper Brittleness. D. C. Buffum and L. D. Jaffe. *Journal of Metals*, v. 3, July 1951: *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 540.

Results of investigation for SAE 3140 steel. (Q29, Q23, AY)

396-Q. A Study of the Plastic Behavior of High-Purity Aluminum Single Crystals at Various Temperatures. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 545-547.

Discussion of above paper by F. D. Rosi and C. H. Mathewson. (Sept. 1950 issue; see item 626-Q). (Q2, Q24, Al)

397-Q. A Study of the Strain Markings in Aluminum. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 547-548.

Discussion on above paper by Bani R. Banerjee. (Sept. 1950 issue; see item 622-Q). (Q24, M27, Al)

398-Q. The Textures of Cold-Rolled and Annealed Titanium. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 549-550.

Discussion of above paper by Howard T. Clark, Jr. (Sept. 1950 issue; see item 625-Q). (Q24, M23, Ti)

399-Q. The Properties of Some Magnesium-Lithium Alloys Containing Aluminum and Zinc. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 556-557.

Discussion of above paper by Robert S. Busk, Donald L. Lemon, and John J. Casey. (July 1950 issue; see item 433-Q). (Q23, N7, Mg)

400-Q. Hydrogen Embrittlement of SAE 1020 Steel. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 558-560.

Discussion of above paper by J. B. Seabrook, N. J. Grant, and Dennis Carney. (Nov. 1950 issue; see item 789-Q). (Q23, CN)

401-Q. The Effect of Sodium Contamination on Magnesium-Lithium Base Alloys. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 557-558.

Discussion of above paper by P. D. Frost, J. H. Jackson, A. C. Loonman, and C. H. Lorig. (Sept. 1950 issue; see item 627-Q). (Q23, E10, Mg)

402-Q. Strength of Pipes & Spring Material As Affected By Length. Victor Tatarinov. *Steel Processing*, v. 37, June 1951, p. 284-285, 309.

Tests conducted to determine ultimate strength in torsion require certain corrections on specimen's length effect. For that purpose, a reasonable correction factor was introduced into the classical strength formulas. Its values were established from test data, and are plotted. (Q1)

403-Q. Production Evaluation of Cutting Tool Materials. Part II. Thomas Badger. *Tool Engineer*, v. 27, July 1951, p. 44-48.

The following properties of cast alloy cutting-tool materials are compared with those of carbides: red hardness, hardenability, hardness, response to heat treatment, shear strength, tensile strength, compressive strength, wear resistance, toughness, ease of fabrication into finished tools, influence of section size on cutting properties, practical design considerations, and cost. (Q general, SG-j, C-n)

404-Q. Brittle Coatings for Stress Analysis. Part II. Greer Ellis. *Tool Engineer*, v. 27, July 1951, p. 49-50. (Q25)

405-Q. Electrical Resistance Strain Gauges. M. J. Sargeaunt. *Machinery*

Lloyd (Overseas Ed.), v. 23, June 9, 1951, p. 79, 81, 83, 85-86.
Includes theory of operation. (Q25)

406-Q. A Mechanism for the Growth of Deformation Twins in Crystals. A. H. Cottrell and B. A. Bilby. *Philosophical Magazine,* ser. 7, v. 42, June 1951, p. 573-581.
By extending the recent theory of slip bands, proposed by Frank and Read, it is shown that a dislocation can move steadily from plane to plane in a crystal. A theory of mechanical twinning, which is formally analogous to Frank's theory of crystal growth is developed. (Q24, N5)

407-Q. The Development of Deformation Textures in Metals. Part II. Body-Centered Cubic Metals. E. A. Calnan and C. J. B. Clews. *Philosophical Magazine,* ser. 7, v. 42, June 1951, p. 616-635.
Qualitative treatment of the development of deformation textures in face-centered cubic metals, described in Part I, is extended to those of body-centered cubic structure. Main features of tension, compression, rolling, and drawing textures are predicted. 13 ref. (Q24, Fe)

408-Q. Analysis of Stresses. (In French.) Pierre Laurent. *Bulletin du Cercle d'Etudes des Métaux,* v. 5, Sept.-Dec. 1950, p. 358-375.
Some particular problems, not the general parameters. Among the points discussed are: deformation, the cold-working curve, the elastic domain and its limits, striction and crystalline structure, and rupture of crystals. (Q24, Q25)

409-Q. Effect of Cold Working on the Internal Friction of Iron and Steel, With or Without a Hydrogen Charge. (In French.) Paul Bastien and Pierre Azou. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, May 16, 1951, p. 1845-1948.
Study of 0.08% C steel showed that charging with H_2 by immersion in a solution of HCl and Na_2S has little effect on internal friction unless the steel is first plastically deformed. (Q22, CN)

410-Q. New Dynamic Method for Measuring Constants of Elasticity. (In French.) R. Cabarat. *Metaux: Corrosion—Industries,* v. 26, Mar. 1951, p. 126-130.
Method is applicable to all solid materials over a considerable temperature range. Use of an alternating electric field permits detection of all bodies which are conductors; and, in the case of a dielectric, use of a thin surface layer on the conductor does not appreciably alter the mechanical properties of the material. (Q21)

411-Q. Influence of Internal Tension on Resistance to Corrosion Fatigue. (In French.) Hans Buhler. *Métaux: Corrosion—Industries,* v. 26, Mar. 1951, p. 142-144.
Internal tensions created by hardening and their effect on improving resistance to bending and torsion of plain-carbon steel, were studied. (Q25, R1, CN)

412-Q. Elastic Deformation of Mono and Polycrystals. (In French.) Léon Guillet. *Métaux: Corrosion—Industries,* v. 26, Apr. 1951, p. 153-158.
Elastic constants of various metals, elastic anisotropy of grains and aggregates, modulus of elasticity of alloys, and evidence for allotropic transformations of alloys by thermoelastic methods. Data for various metals and alloys are tabulated and charted. 12 ref. (Q21, N6)

413-Q. Behavior of Cuprous Metals Subject to Permanent Mechanical Stress. (In French.) J. Hérenguel and M. Scheidecker. *Revue de Métallurgie,* v. 48, Mar. 1951, p. 173-181; disc., p. 181.
Effects of various factors on the cracking of brass. Micrographs and macrographs are included. (Q26, Cu)

414-Q. New Methods for Study and Testing of Metals and Their Application To Welded Structures. (In French.) J. J. L. van Maanen. *Revue de la Soudure Lastijdschrift,* v. 7, no. 1, 1951, p. 1-15.
A new theory of M. H. M. Schnadt, including his own definition of values characterizing the strength of welded structures. Theoretical bases of this new theory. Proposes new unit for the energy of plastic deformation. The Schnadt impact-test specimens and their use and the general relationship between stress and deformation. (Q23, Q6, K general, CN)

415-Q. Variations in the Structure of Heat Resistant Steels of the 2¼% Chromium, 1% Molybdenum Type. (In French.) L. Habraken. *Revue Universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 94, May 1951, p. 164-180.
Studied by radiocrystallography and electron microscope methods. Variations in chemical composition and rate of cooling were found to cause important structural changes. At least three different structures were isolated and it was shown that the best resistance to creep is obtained when structural modifications are least. Hypothesis is developed that there are two distinct creep processes for steel, just as for pure metals. (Q3, M27, AY, SG-h)

416-Q. Study of Fatigue in Welded Assemblies. (In French.) H. de Leiris. *Soudure et Techniques Connexes,* v. 5, Mar.-Apr. 1951, p. 53-64; disc., p. 64-65.

Welded construction of internal ship structures and stresses to which they are subjected. Compares various methods; design and operation of a hydraulic fatigue-testing apparatus. Results of experiments on nonwelded steel plates, on welds arranged transversely to stress, on sheets joined by welding, on welded assemblies arranged transversely to stress, and finally on welds or assemblies arranged parallel to the stress. (Q7, K9, CN)

417-Q. Preliminary Tests on an Aging Notch-Impact Sample With a Forged Notch. (In German.) Walther Dick. *Archiv für das Eisenhüttenwesen,* v. 22, May-June 1951, p. 161-170.

Experiments were made with as-cast and normalized steel specimens. Results were compared with those of the standard VDM tests. The forged notch is recommended for its economy. However, further experiments are recommended to determine which test is more accurate. (Q6, CN)

418-Q. Determining Aging Notch-Impact Strength With Forged Notches. (In German.) Alfred Krüger. *Archiv für das Eisenhüttenwesen,* v. 22, May-June 1951, p. 171-176.

Results using forged notch were compared with those of the Standard VDM test (machined notch) on unalloyed openhearth and basic steels containing 0.05-0.11% C. Results, which agree rather well in the case of low-C steels, deviate increasingly with increasing C content. (Q6, CN)

419-Q. Discussion of the General Problems of Elongation and Strength in Mechanical Testing. (In Italian.) F. Gatto. *Alluminio,* v. 20, 1951, p. 129-135.

Theoretical mathematical analysis of the relationship between elongation and test duration. Two equations for calculation of the relationship, also their graphical interpretation. (Q27)

420-Q. Investigations of Welded-Structural Parts Made of Steels Having Different Mechanical Properties. (In Russian.) G. P. Mikhailov, A. E. Solomohnikov, and L. A. Kaplan. *Avtogennoe Delo* (Welding), v. 22, Feb. 1951, p. 13-14.

A theoretical method for calculating design of welded structures containing both low-carbon and alloy steels. Experiment shows applicability of proposed formulas. (Q general, K9, CN, AY)

421-Q. Relations Between Initial and Final Orientations in Rolling and Annealing of Silicon Ferrite. B. F. Decker and David Harker. *Journal of Applied Physics,* v. 22, July 1951, p. 900-904.

Investigation of effects of rolling and annealing on orientation of individual grains in silicon ferrite strip yielded results which led to formulation of a theory for the appearance of "magnetic" orientation in the final processed strip. It is believed that the theory can be applied to other systems, although direct experimental evidence exists only in the case of silicon ferrite, a body-centered cubic alloy. Includes pole-figure diagrams and back-reflection Laue photographs. (Q24, P16, SG-p)

422-Q. Anelastic Effects Arising From Precipitation in Aluminum-Zinc Alloys. A. S. Nowick. *Journal of Applied Physics,* v. 22, July 1951, p. 925-933.

Torsion experiments on an Al-Zn alloy (20% Zn) show that precipitation produces large values of internal friction. After prolonged periods of aging, sufficient to produce growth of the precipitate particles, internal friction begins to decrease. Curves of internal friction vs. temperature do not show a peak but rise indefinitely with increasing temperature. This behavior cannot readily be interpreted in terms of the usual concept of a relaxation spectrum, but requires a new concept of "coupled relaxations". Metallographic examination reveals that large internal friction is correlated with discontinuous precipitation. The observed anelasticity is interpreted in terms of fragmentation of the lattice. 23 ref. (Q22, N7, A1)

423-Q. Observations on Some Wrought Aluminium-Zinc-Magnesium Alloys. Maurice Cook, R. Chadwick, and N. B. Muir. *Journal of the Institute of Metals,* v. 79, July 1951, p. 293-320.

High-strength Al-Zn-Mg wrought alloys containing up to 12% Zn, 3.5% Mg, and 3% Cu, as well as Cr, Mn, Fe, and Si in amounts of less than 1% each, were investigated. In addition, the freezing characteristics were investigated to ascertain compositions with small eutectic contents and, hence, desirable casting properties. A comparison was made of the casting and extrusion characteristics of two alloys with similar mechanical properties in the wrought condition, the one having a small and the other a large eutectic content. Superiority of the former was confirmed. 28 ref. (Q general, N12, A1)

424-Q. Properties of Materials Under Extreme Pressures. Percy W. Bridgman. *Machine Design,* v. 23, July 1951, p. 210, 212, 215-216, 220. (Con-

densed from 5th Chas. M. Schwab Memorial Lecture, presented May 23, 1951, at general AISI meeting in New York.)

Describes work in which pressures of 45,000-180,000 psi. were used routinely, and in which 300,000 psi. was occasionally reached. The unusual behavior of metals at such pressures and some of its practical implications are described and discussed. (Q general)

425-Q. Creep and Fatigue. *Metal Industry,* v. 78, June 29, 1951, p. 528-529.

Factors involved and suggestions for further research. (Q3, Q7)

426-Q. A Method for Assessing the Coiling Properties of Tungsten Wire. W. G. Creasy and G. Wright. *Research,* v. 4, July 1951, p. 323-325.

Method and apparatus design to test coiling property, which is of great importance when the wire is to be used in coils for incandescent-lamp filaments. (Q5, W9)

427-Q. Automatic Stopping Devices Speed Fatigue Tests. *Steel,* v. 129, July 16, 1951, p. 78.

Several devices recently developed at National Bureau of Standards. Auxiliary test equipment includes devices for stopping the testing machine when a small crack forms in a specimen, apparatus for uniform polishing of fatigue test specimens, and for fatigue testing thin sheet specimens in bending. (Q7)

428-Q. New Devices Speed Metal Fatigue Tests. *Technical News Bulletin* (National Bureau of Standards), v. 35, July 1951, p. 103-105.

A few devices developed by John A. Bennett and James L. Baker. (Q7)

429-Q. Fatigue in Light Alloy Assemblies. (In French.) R. Boccon-Gibod. *Revue de Métallurgie,* v. 48, May 1951, p. 369-375; disc., p. 375.

Classifies types of assembly. Results on welded, plastic-cemented and riveted assemblies. Compares results with those obtained for steel. (Q7, Al, Mg)

430-Q. Molybdenum as an Alloying Element in Structural Steels and Several Tool Steels. (In German.) Hans Ulrich Meyer. *Berg-und Huttenmannische Monatshefte,* v. 96, May 1951, p. 105-116.

The problem of improving the mechanical properties of steel is greatly simplified by the fact that slight amounts of Mo increase their hardenability, produce more uniform properties, and reduce or even eliminate temper brittleness. 20 ref. (Q general, AY, Mo)

431-Q. Grinding and Wear. (In German.) Wilhelm Späth. *Metalloberfläche,* ser. A, v. 5, June 1951, p. A81-A84.

Despite close relationship between grinding and wear, wear tests made by grinding metal articles to be tested often result in completely misleading results. Tests for different types of wear. The adoption of specific and well-defined standards is proposed. 13 ref. (Q9)

432-Q. Effect of Several Production Conditions on the Creep Resistance of Light-Metal Alloys. (In German.) Hugo Vosskühler. *Zeitschrift für Metallkunde,* v. 42, May 1951, p. 141-147.

Difference in strength properties between sand and chill-mold castings and between cast and wrought alloys; also the effect of grain size, extrusion temperature, and extrusion preliminary to forging on physical properties. (Q3, Q general, Al, Mg)

433-Q. Application of X-Ray Investigation to Explain the Effect of Yield Point on Fatigue Strength. (In German). Alfred Schaal. *Zeitschrift für Metallkunde,* v. 42, May 1951, p. 147-154.

Study on worked and unworked plain carbon and alloy steels. Includes X-ray diffraction patterns, tables, and graphs. 14 ref. (Q7, M22, CN, AY)

434-Q. (Book) **The Mathematical Theory of Plasticity.** R. Hill. 354 pages. 1950. Oxford University Press, London. (QA931 H55m).

A systematic development of stress-strain relations, laws of yielding and work-hardening in solids, especially metals, is given. Analysis of stresses and strains in technological processes, such as rolling, forging, and drawing is presented. (Q)

435-Q. The Application of Plastic Theory to Bending. M. Ish-Horowicz. *Aircraft Engineering,* v. 23, July 1951, p. 203-206.

General theoretical principles involved in applying "limit design" to structural members. 36 ref. (Q23, Q5)

436-Q. Stress Concentration in Built-Up Structural Members. J. W. Carter. *American Railway Engineering Association—Bulletin* v. 53, June-July 1951, p. 1-34.

Analysis of tests made at Purdue University to determine stress concentrations in plates in the vicinity of rivet or bolt holes under varying conditions of pitch, gage, edge distance, bearing, and clamping force. 10 ref. (Q25, ST)

437-Q. Determination of the Dynamic Coefficient of Friction for Transient Conditions. G. G. Gould. *Trans-*

actions of the American Society of Mechanical Engineers, v. 73, July 1951, p. 649-654; disc., p. 654.

A numerical value cannot be assigned to the coefficient of sliding friction between two materials. Curves show the behavior of friction during a transient period for many different combinations of friction materials and mating surfaces. Considers specifically friction-clutch and brake applications. (Q9, CN, SS, CI, Ni, Cr, Cu)

438-Q. Effect of Internal Pressure on Stresses and Strains in Bolted-Flanged Connections. D. B. Wesstrom and S. E. Bergh. *Transactions of the American Society of Mechanical Engineers,* v. 73, July 1951, p. 553-562; disc., p. 562-568.

Actual conditions existing in a bolted joint of alloy steels will be considerably different from those assumed when using concept of design as specified by ASME Unfired Pressure Vessel Code. Formulas are derived and results summarized in the form of a design procedure. (Q25, K13, AY)

439-Q. Performance of Oil-Film Bearings With Abrasive-Containing Lubricant. A. E. Roach. *Transactions of the American Society of Mechanical Engineers,* v. 73, July 1951, p. 677-685; disc., p. 685-686.

An experimental study. It is found that the rate of temperature rise suffered by the bearing when abrasive-containing oil is introduced offers a convenient criterion for rating the embedability performance. Relative embedability ratings for 17 different bearings are correlated with wear rates. 10 ref. (Q9, CN, Cu, Al)

440-Q. The Effect of Oil Viscosity on the Power-Transmitting Capacity of Spur Gears. V. N. Borsoff, J. B. Accinelli, and A. G. Cattaneo. *Transactions of the American Society of Mechanical Engineers,* v. 73, July 1951, p. 687-694; disc., p. 694-696.

Tests show that a relationship exists between the maximum horsepower which gears can transmit without scoring, and the product of gear speed and lubricant viscosity. An analysis of the factors entering into this relation indicates that the influence of lubricant viscosity on the power-transmitting capacity of gears is much too great to be neglected in the design of gears. (Q9, AY)

441-Q. Explanation of Hot-Cracking of Mild Steel Welds, E. C. Rollason and D. F. T. Roberts. *Australasian Engineer,* May 7, 1951, p. 85-87.

Previously abstracted from *Welding Research* (bound with *Transactions of the Institute of Welding).* See item 137-Q, 1951. (Q27, K1, CN)

442-Q. Properties of Materials and Engineering Uses of Cast Metals. R. W. Bailey. *Engineering,* v. 172, July 6, 1951, p. 29-32.

Cast metals may offer an alternative to wrought metals where their mechanical properties will permit it. Ductility, tensile strength, elasticity, and fatigue-resistance of steel castings. (Q general, CI)

443-Q. Analysis of Rockwell Hardness Test, Employing a New Deadweight Testing Machine. C. E. Phillips and A. J. Fenner. *Engineering,* v. 172, July 13, 1951, p. 57-61.

The use of dead-weight loading and a frictionless support of the indenter eliminates the possibility of random errors in the magnitudes of applied loads. Results of experiments made on nine steel plates. (Q29)

444-Q. Stress-Testing of Metals at High Temperatures. *Industrial Heating,* v. 18, July 1951, p. 1186, 1188.

Relates the above to present-day high efficiency and reliability of boilers, and generally reviews metallurgical practices in testing. (Q general)

445-Q. Production Problems. VI. Failure of Steel Sheet During Pressing. *Iron and Steel,* v. 24, July 1951, p. 335-336.

Steel sheet $\frac{3}{16}$ in. thick, which failed during blanking and pressing was investigated. Mechanical tests and micro-examination were performed on the specimens. (Q general, G2, CN)

446-Q. Strain Rate Sensitivity of Molybdenum at Room Temperature. Robert Maddin and Robert Pond. *Metal Progress,* v. 60, July 1951, p. 76-78.

Investigates the effect of strain rate on the elongation, reduction of area, tensile strength, yield strength and rupture strength of Mo. (Q27, Mo)

447-Q. Properties of Metals Used at Low Temperatures. *Metal Progress,* v. 60, July 1951, p. 79-80, 108, 110, 114, 116, 118.

Review of nine papers and a movie presented at the Annual Metallurgical Conference held at the National Bureau of Standards. Papers covered the influence of low temperatures on the mechanical properties of metals. (Q general)

448-Q. The Plastic Theory of Bending of Mild Steel Beams With Particular Reference to the Effect of Shear Forces. M. R. Horne. *Proceedings of*

the Royal Society, ser. A, v. 207, June 22, 1951, p. 216-228.

While the simple plastic theory of bending gives a satisfactory explanation of observed behavior of mild steel beams, it is open to various theoretical objections. These are examined by reference to the theory of perfectly plastic materials, and a special examination is made of the effect of shear forces, for which no allowance is made in the simple theory. Results are applied to beams of both rectangular and I-section, and it is shown that the error involved in using the simple theory is small except for very short members. (Q5, CN)

449-Q. Stresses Imposed by Processing. O. J. Horger. *SAE Quarterly Transactions*, v. 5, July 1951, p. 393-403.

Thermal and transformation stresses that are developed in some heat treating operations and how they affect machine parts. Discusses macroscopic types of stresses rather than microstresses. 27 ref. (Q25, J general)

450-Q. Slip of Structural Steel Double-Lap Joints Assembled With High-Strength Bolts. Part II. Effect of Surface Condition of Faying Area Upon Slip. D. R. Young and R. A. Hechtman. *Trend in Engineering at the University of Washington*, v. 3, July 1951, p. 23-26.

Bolted joints with various surface conditions were tested. Coefficients of friction for mill-scale plates with drilled, subpunched and reamed holes were determined. Varnish or red-lead paint on the faying surfaces exhibited little resistance to slip. (Q9, K13, CN)

451-Q. Interpretive Report on Box Girders and Small Specimens. LaMotte Grover, E. M. MacCutcheon, W. S. Pellini, W. Spraragen, and J. Vasta. *Welding Journal*, v. 30 July 1951, p. 321s-326s.

The effect of a combination of high residual stresses, with severe constraint against ductile behavior, upon the capacity of a structural member for resisting rupture under external load was investigated. Extent of deformation which occurs when the member is subjected to continually increased loading, with the load relaxed between increments of loading was determined. Structures made of steels which are not relatively notch sensitive at low temperatures are able better to sustain loads at such low temperatures than those which are made of notch-sensitive steels. (Q23, T26)

452-Q. Relative Strain Aging Tendency of Weld and Base Metal. E. J. Ripling and L. J. Klingler. *Welding Journal*, v. 30, July 1951, p. 356s-358s.

Complex relationships between prestraining, strain aging and testing temperature on SAE 1340 steel, quenched and tempered at various temperatures. Discussion of paper by R. W. Fountain and R. D. Stout in January 1951 issue. See item 50-Q. (Q23, J27, CN)

453-Q. ML Aluminum Casting Alloy —A Material for Elevated Temperatures. J. C. McGee. *CADO Technical Data Digest*, v. 16, Aug. 1951, p. 6-7.

Comparative mechanical properties of above alloy and a number of other standard Al alloys at room temperature and 600° F. Principal properties covered are tensile, yield, and creep strengths. Nominal composition of the new alloy is 4% Cu, 2% Ni, 2% Mg, 0.3% Mg, 0.3% Cr, 0.05% V, 0.1% Ti, rest Al. (Q general, Al, SG-h)

454-Q. A Survey of Some Recent Researches in Theory of Elasticity. J. N. Goodier. *Applied Mechanics Reviews*, v. 4, June 1951, p. 330-332.

Numerous references classified by subject. (Q21)

455-Q. Theories of Mechanical Behavior of Materials. Alfred M. Freudenthal. *Applied Mechanics Reviews*, v. 4, July 1951, p. 394-396.

103 references. (Q general)

456-Q. Effect of Alloying Elements on the Elevated Temperature Plastic Properties of Alpha Solid Solutions of Aluminum. O. D. Sherby, R. A. Anderson, and J. E. Dorn. *Journal of Metals*, v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 643-652.

Solid-solution alloying increases the plastic properties of Al at elevated temperatures by solid-solution strengthening, by restraining recovery and recrystallization, and by a Cottrell effect. When binary aluminum alloys are strained and aged at 194 to 300° K. they develop a yield point. This is attributed to a migration of dislocations to solute atoms during aging. 13 ref. (Q23, N7, Al)

457-Q. Structural Studies of Plastic Deformation in Aluminum Single Crystals. N. K. Chen and C. H. Mathewson. *Journal of Metals*, v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 653-660.

Single crystals of high-purity Al of various orientations were carefully documented after plastic extension. Special attention was given to the formation of slip lines, deformation bands, and asterism. An ex-

planation for the geometry and mechanism of formation of deformation bands is considered. 21 ref. (Q24, Al)

458-Q. Determination of the Fatigue Limit of Metals by Means of a Three-Ring Test Machine. M. M. Khrushchov and M. A. Babichev. *Engineers' Digest*, v. 12, July 1951, p. 230. (Translated and condensed)

Previously abstracted from *Zavodskaya Laboratoriya* (Factory Laboratory). See item 9-313, 1949. (Q7)

459-Q. Preliminary Investigation of Wear and Friction Properties Under Sliding Conditions of Materials Suitable for Cages of Rolling-Contact Bearings. Robert L. Johnson, Max A. Swikert, and Edmond E. Bisson. *National Advisory Committee for Aeronautics*, Technical Note 2384, June 1951, 31 pages.

Investigations of wear and friction properties of a number of materials operating against SAE 52100 steel were conducted. Materials included brass, bronze, Be, Cu, monel, Nichrome V, 24S-T Al, nodular Fe, and gray cast Fe. The ability of materials to form surface films that prevent welding is a most important factor in both dry friction and boundary lubrication. 11 ref. (Q9, ST, Be, Cu, Ni, Al, Fe)

460-Q. Fatigue Strengths of Aircraft Materials, Axial-Load Fatigue Tests on Notched Sheet Specimens of 24S-T3 and 75S-T6 Aluminum Alloys and of SAE 4130 Steel with Stress Concentration Factors of 2.0 and 4.0. H. J. Grover, S. M. Bishop, and L. R. Jackson. *National Advisory Committee for Aeronautics*, Technical Note 2389, June 1951, 64 pages.

Results of axial-load fatigue tests on notched specimens of the above. Fatigue tests were run at several levels of nominal mean stress, including a zero nominal mean stress. (Q7, Al, ST)

461-Q. Fatigue Strengths of Aircraft Materials. Axial-Load Fatigue Tests on Notched Sheet Specimens of 24S-T3 and 75S-T6 Aluminum Alloys and of SAE 4130 Steel With Stress-Concentration Factor of 5.0. H. J. Grover, S. M. Bishop, and L. R. Jackson. *National Advisory Committee for Aeronautics*, Technical Note 2390, June 1951, 19 pages.

Each specimen was notched by edge notches designed to have a theoretical stress-concentration factor of 5.0. Tests were run at four levels of nominal mean stress: 0, 10,000, 20,000, and 30,000 psi. (Q7, Al, ST)

462-Q. Charts Giving Critical Compressive Stress of Continuous Flat Sheet Divided into Parallelogram-Shaped Panels. Roger A. Anderson. *National Advisory Committee for Aeronautics*, Technical Note 2392, July 1951, 31 pages.

Stability under compressive stress of continuous flat sheet divided by nondeflecting supports into an array of parallelogram-shaped panels. Wide ranges of panel skewness and aspect ratio were investigated, and two orientations of the parallelogram-shaped panels with respect to the direction of the applied stress were considered. The results are presented in the form of charts of theoretical buckling-stress coefficients as a function of panel skewness and aspect ratio. (Q28)

463-Q. Influence of Tensile Strength and Ductility on Strengths of Rotating Disks in Presence of Material and Fabrication Defects of Several Types. Arthur G. Holms, Joseph E. Jenkins, and Andrew J. Repko. *National Advisory Committee for Aeronautics*, Technical Note 2397, June 1951, 39 pages.

The significance of tensile strength and ductility in the presence of defects and the strength-reducing effects of several types of defect were investigated for some rotating disks. The types of defect investigated included laminar-type irregularities, eutectic melting, and shrink porosity. (Q23, SS)

464-Q. Observations on Bauschinger Effect in Copper and Brass. H. Schwartzbart, M. H. Jones, and W. F. Brown, Jr. *National Advisory Committee for Aeronautics*, Research Memorandum E51D13, June 19, 1951, 37 pages.

The effect of prestrain in tension upon the stress-strain characteristics in compression was studied for Cu and brass. Compression testing of Cu prestrained in tension various amounts yielded: that the Bauschinger effect developed at very small prestrains was independent of prestrains and disappeared after the strain in the suosequent compression test exceeded $\delta = 0.01$. Tensile prestrain weakened the material in subsequent compression and affected the shape of the stress-strain curve obtained. 19 ref. (Q24, Cu)

465-Q. Effect of Surface Finish on Fatigue Properties at Elevated Temperatures. I. Low-Carbon N-155 With Grain Size of A.S.T.M. 1. Robert R. Ferguson. *National Advisory Committee for Aeronautics*, Research Memorandum E51D17, June 26, 1951, 18 pages.

The effect of three surface finishes of varying roughnesses on the fatigue properties was determined

for low-carbon N-155 alloy of grain size A.S.T.M. 1 at temperatures of 80, 1000, 1350, and 1500° F. The fatigue properties for the various finishes differed at room temperatures; after short periods at 1000° F. and for all periods investigated at temperatures above 1000° F., specimens having different finishes had the same fatigue strength. (Q7, CN)

466-Q. Determination of the Effective Strained Length of Standard Stud Bolts. Robert S. Sherwood and Richard C. Dove. *American Society of Mechanical Engineers,* Paper 51-S-2, 1951, 10 pages.

Reports on a project in an attempt to develop a better method for relating initial tensile strain in a threaded fastener to over-all elongation produced during tightening. Errors of the present method of relating initial tensile strain to elongation. A new formula relating initial tensile strain and elongation is derived. (Q27, K13)

467-Q. Damping, Fatigue, and Dynamic Stress-Strain Properties of Mild Steel. B. J. Lazan and T. Wu. *American Society for Testing Materials,* Preprint 22, 1951, 30 pages.

Above properties were investigated in recently developed rotating-beam testing equipment. Effect of several important test variables, such as stress magnitude, history, frequency, and rest. Stress magnitude and stress history data are analyzed in terms of cyclic-stress-sensitivity limit and stabilized damping points. These data are presented in S-N-N, S-N-D, and other new types of diagrams to indicate not only the fatigue behavior but also damping and dynamic-modulus properties. 13 ref. (Q7, Q8, CN)

468-Q. Creep Characteristics of Phosphorized Copper (0.019 Per Cent P) at 300, 400, and 500 F. A. I. Blank and H. L. Burghoff. *American Society for Testing Materials,* Preprint 35, 1951, 13 pages.

Tests made in three annealed and three cold drawn tempers. Results compared with those previously obtained by the authors on other types of copper. (Q3, Cu)

469-Q. Report of Joint Committee on Effect of Temperature on the Properties of Metals. Ernest L. Robinson, chairman. *American Society for Testing Materials,* Preprint 92, 1951, 7 pages.

Summarizes meetings, publications, technical papers, finances, research projects, personnel, and panel activities. (Q general)

470-Q. Report of Committee B-9 on Metal Powders and Metal Powder Products. W. A. Reich, chairman. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 184-187.

Previously abstracted from *American Society for Testing Materials.* Preprint 8a, 1950. See item 463-Q, 1950. (Q general, H general, S22)

471-Q. Report of Committee E-9 on Fatigue. R. E. Peterson, chairman *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 497-508.

Previously abstracted from *American Society for Testing Materials.* Preprint 107, 1950. See item 481-Q, 1950. (Q7)

472-Q. The Influence of Strain Rate on Some Tensile Properties of Steel. D. S. Clark and P. E. Duwez. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 560-575; disc., p. 576.

Previously abstracted from *American Society for Testing Materials,* Preprint 17, 1950. See item 465-Q, 1950. (Q27, Q6, ST)

473-Q. The Influence of Specimen Dimension and Shape on the Results in Tension Impact Testing. D. S. Clark and D. S. Wood. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 577-585; disc., p. 586.

Previously abstracted from *American Society for Testing Materials,* Preprint 43, 1950. See item 476-Q, 1950. (Q27, CN, Cu)

474-Q. Effect of Variations in Notched Acuity on the Behavior of Steel in the Charpy Notched-Bar Test. N. A. Kahn, E. A. Imbembo, and F. Ginsberg. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 619-647; disc., p. 647-648.

Effects of small variations in notch-root radius of Charpy V and keyhole-type specimens on the energy-absorption level and location of the transition temperature region of a number of steels. Materials used consisted of Navy medium and high-tensile strength steels and SAE 1045 and 4620 steels, heat treated to tensile strength levels of approximately 60,000, 70,000, 85,000, 110,000, or 155,000 psi. (Q6, CN, AY)

475-Q. The Fatigue Strength of Steel Through the Range From ½ to 30,000 Cycles of Stress. M. H. Weisman and M. H. Kaplan. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 649-665; disc., p. 666-667.

Relatively few fatigue tests reported in the literature include data for lifetimes of less than 50,000 cycles. Data from this report were compiled and replotted in terms of life vs. stress in per cent of tensile strength. Unidirectional axial-load and sheet-bending fatigue tests were

conducted to obtain short-life fatigue data for SAE 4340 steel heat treated to 215,000 psi. tensile strength. Fatigue-strength curves based on the information compiled are presented for both smooth and notched specimens and for unidirectional as well as for reversed loading. 24 ref. (Q7, AY)

476-Q. Effects of Grinding and Other Finishing Processes on the Fatigue Strength of Hardened Steel. L. P. Tarasov and H. J. Grover. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 668-687; disc., p. 687-698.

Previously abstracted from *American Society for Testing Materials.* Preprint 18, 1950. See item 466-Q, 1950. (Q7, G18, G19, AY)

477-Q. Effect of Chromium Plating on the Endurance Limit of Steels Used in Aircraft. Hugh L. Logan. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 699-713; disc., p. 714-716.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 3B-219, 1949. (Q7, L17, Cr, AY)

478-Q. Fatigue Notch-Sensitivities of Some Aircraft Materials. Horace J. Grover. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 717-729; disc., p. 730-734.

Information for SAE steels 4130, 4140, and 4340; Al alloys 24S-T and 75S-T; and 18-8 stainless steel. The tabulated and charted data fail to provide rules for accurate design; however, some principles believed to be conservative are derived. 12 ref. (Q7, AY, Al, SS)

479-Q. Effects of Anodic Coatings on the Fatigue Strength of Aluminum Alloys. G. W. Stickley and F. M. Howell. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 735-742; disc., p. 743.

Previously abstracted from *American Society for Testing Materials*, Preprint 32, 1950. See item 470-Q, 1950. (Q7, L19, Al)

480-Q. Effect of Various Treatments on the Fatigue Strength of Notched S-816 and Timken 16-25-6 Alloys at Elevated Temperatures. W. E. Jones, Jr., and G. B. Wilkes, Jr. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 744-760; disc., p. 761-762.

Previously abstracted from *American Society for Testing Materials*, Preprint 35, 1950. See item 472-Q, 1950. (Q7, G23, Co, SG-h)

481-Q. Hardening of Austenitic Stainless Steels by Mechanical Working at Sub-Zero Temperatures. N. A. Ziegler and P. H. Brace. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 882-892; disc., p. 880-881.

Previously abstracted from *American Society for Testing Materials*, Preprint 39, 1950. See item 474-Q, 1950. (Q general, F22, F23, G23, SS)

482-Q. Hardened Alloy Steel for Service Up to 700 F. G. V. Smith, W. B. Seens, and E. J. Dulis. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 882-892; disc., p. 893-894.

Previously abstracted from *American Society for Testing Materials*, Preprint 36, 1950. See item 473-Q, 1950. (Q general, AY)

483-Q. Effect of Temperature on the Mechanical Properties, Characteristics, and Processing of Austenitic Stainless Steels. V. N. Krivobok and A. M. Talbot. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 895-928; disc., p. 929-930.

Results of investigations show that processing such as rolling of commercial austenitic stainless steels at subzero temperatures enhances mechanical properties and improves other characteristics of the steels. Improvement of ductility characteristics, under subzero temperatures, of steels strengthened by rolling is discussed in terms of its relation to the forming process. 10 ref. (Q general, F23, SS)

484-Q. Effect of Rate of Strain on the Flow Stress of Gas Turbine Alloys at 1200 and 1500 F. M. J. Manjoine. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 931-948; disc., p. 949-950.

Results of tension tests at 1200 and 1500° F. on group of high-temperature, gas-turbine alloys. Tests include creep and creep-rupture tests, constant strain rate tests, and high-speed impact tests. Strengths are shown for strain rates from 10^{-7} to 10^{+6} per hr. Factors which influence the flow-stress of a metal and a generalized flow-stress curve. Short-time methods of comparing alloys and limitations of these methods. 32 ref. (Q23, Ni, Co, SG-h)

485-Q. The Selection of a Limited Number From Many Possible Conditioning Treatments for Alloys to Achieve Best Coverage and Statistical Evaluation. J. M. Cameron and W. J. Youden. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 951-960; disc., p. 961-964.

Stress-rupture data present special problems because the number of conditioning factors preclude exhaustive exploration of all combinations of these factors and the test results necessarily involve different test temperatures and loads so that

hours to rupture of specimens from different conditioning treatments are not directly comparable. Gives a method for comparing test results and considers the planned selection of combinations of conditioning factors for testing in order to facilitate the statistical analysis. (Q4, S12)

486-Q. Magnesium-Cerium Cast Alloys for Elevated-Temperature Service. K. Grube and L. W. Eastwood. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 989-1010; disc., p. 1011-1012.

About 350 heats of Mg-Ce alloys, most of which contained other elements, were prepared and studied. Evaluation was based on tension tests at room temperature and at 600° F.; creep tests at 600° F., using a 2000-psi. and a 2500-psi. load; and macro and micro-examinations. 6% Ce was selected as a compromise between cheaper and lower-density alloys of lower Ce content, on the one hand, and higher strength alloys of still higher Ce content, on the other. 12 ref.
(Q3, Q27, Mg, SG-h)

487-Q. Tensile Properties of Some Aircraft Structural Materials at Various Rates of Loading. Richard F. Klinger. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1035-1050; disc., p. 1051-1053.

Previously abstracted from *American Society for Testing Materials,* Preprint 25, 1950. See item 468-Q, 1950. (Q27, T24, Al)

488-Q. Combined Tension Torsion Creep-Time Relations for Aluminum Alloy 2S-O. Joseph Marin, J. H. Faupel, and L. W. Hu. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1054-1070; disc., p. 1071-1072.

Previously abstracted from *American Society for Testing Materials,* Preprint 33, 1950. See item 471-Q, 1950. (Q27, Q1, Q3, Al)

489-Q. The Reverting of Hard-Drawn Copper to Soft Condition Under Variable Stress. John N. Kenyon. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1073-1081; disc., 1082-1084.

Fatigue tests on long lengths of hard-drawn Cu wire show that "islands" of soft Cu may develop at the periphery. This reverting to large crystals was found to occur in some 30% of the heats tested at room temperatures and in all heats tested at 70° C. It is believed that many transmission line failures, attributed to mechanical defect, are a direct result of this softening phenomenon. (Q7, N5, Cu)

490-Q. The Forming Characteristics of Beryllium Copper Strip. J. T. Richards and E. M. Smith. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1085-1099; disc., p. 1100.

Results of tests to correlate forming characteristics prior to precipitation hardening with usual specification properties including tensile strength, elongation, and Erichsen cup test. Formability is expressed as minimum safe radius for forming a 90° bend by means of a punch and die set-up. Effects of temper, stock thickness, grain size, and grain direction upon formability and miscellaneous design or specification properties. No simple correlation was found relating formability with usual acceptance tests. 15 ref.
(Q23, Cu)

491-Q. Reproducibility of Results of Tension Tests on Specimens Prepared From Cast Steel Coupons. H. A. Schwartz and W. K. Bock. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1167-1175.

Previously abstracted from *American Society for Testing Materials,* Preprint 16, 1950. See item 464-Q, 1950. (Q27, CN)

492-Q. Rockwell C Hardness on Cylindrical Steel Specimens. Frank W. Hussey. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1176-1185; disc., p. 1186-1187.

Previously abstracted from *American Society for Testing Materials,* Preprint 20, 1950. See item 467-Q, 1950. (Q29, CN)

493-Q. A Method for Making Tension Tests of Metals Using a Miniature Specimen. R. L. Templin and W. C. Aber. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1188-1194; disc., p. 1195.

Previously abstracted from *American Society for Testing Materials,* Preprint 28, 1950. See item 469-Q, 1950. (Q27)

494-Q. Symposium on Stresses in Moulds. *Journal of the Iron and Steel Institute,* v. 168, July 1951, p. 261-301.

Papers are abstracted separately. Contains an introduction, and is closed with a general discussion and 20 ref. (Q25, CI)

495-Q. Mechanical Properties of Ingot Mould Irons. J. W. Grant. *Journal of the Iron and Steel Institute,* v. 168, July 1951, p. 263-273.

Mechanical tests were carried out on ingot-mold irons at temperatures up to 800° C. to provide stress-strain data from which stresses in ingot molds may be calculated, and to investigate the behavior of these materials under the type of stress and

strain conditions to which an ingot mold may be subjected during its life. Transverse, tensile, compression, creep, and endurance tests were carried out. (Q general, CI)

496-Q. Poisson's Ratio For Cast Iron Used for Ingot Moulds. J. Woolman. *Journal of the Iron and Steel Institute,* v. 168, July 1951, p. 273-277.

A lateral extensometer suitable for attaching to a test piece in a cylindrical electrical furnace was designed and constructed. With this, in conjunction with a conventional type Lamb roller extensometer, Poisson's ratio determinations were made on a number of ingot-mold irons, both at room and elevated temperatures. A theory is put forward to account for the observed variation in the properties of the iron with graphite size. (Q21, CI)

497-Q. Note on Relaxation Tests on Cast Iron. J. Woolman. *Journal of the Iron and Steel Institute,* v. 168, July 1951, p. 287.

Briefly describes two tests. (Q3, CI)

498-Q. Determination of Surface Stresses in Ingot Moulds. M. W. Butler and W. H. Glaisher. *Journal of the Iron and Steel Institute,* v. 168, July 1951, p. 287-299.

Results of tests and the possibilities of the stress causing failure of the mold by cracking. The temperature cycle at various points in a mold, and the effect of heat treatments designed to promote growth of the mold iron, and to determine the extent of residual stresses in the mold when cold, were examined. (Q25, CI)

499-Q. The Properties of Materials and the Engineering Uses of Cast Metals. R. W. Bailey. *Metallurgia,* v. 44, July 1951, p. 3-8.

Previously abstracted from *Foundry Trade Journal.* See item 393-Q, 1951. (Q general, E general, CI, Cu)

500-Q. Uneven Hardness Gradients in Quenched Steels. Hugh O'Neill. *Metallurgia,* v. 44, July 1951, p. 29-31.

Jominy hardenability curves occasionally show an unusual rise or hump. Similar effects have been found in hardness surveys of welded joints and in steel rails which have had special "hardening" treatment applied to the head. Suggests that the original austenite transforms locally in the intermediate range. (Q29, N8, ST)

501-Q. D.T.D. 424—The Versatile Light Alloy. A. P. Fenn. *Institute of British Foundrymen,* Paper 1005, 1951, 7 pages; *Foundry Trade Journal,* v. 91, July 26, 1951, p. 87-92.

Development of this Al-Cu-Si alloy shows that by various heat treatments, a considerable range of mechanical properties can be obtained, thereby enabling it to be used for a greater variety of applications. The alloy is equally suitable for sand casting, gravity die casting, and pressure die casting. Methods used in the manufacture of one of the largest light-alloy sand castings ever produced. (Q general, E11, E13, Al)

502-Q. Stresses in Gas-Turbine Discs and Rotors. R. W. Bailey. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 30-35.

The nature of the operating stresses in "thin" and "thick" disks, and the resistance of ferritic and austenitic steels to bursting stresses. For austenitic steel, the importance of plastic strain in improving the properties at the central region of a disk or rotor, and thereby raising its bursting speed, is shown. (Q25, T25, SS, AY)

503-Q. Properties of Materials Intended for Gas Turbines. H. W. Kirkby and C. Sykes. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 81-94.

Properties of creep resisting steels suitable for use in the gas turbine and jet engine. Materials are classified under ferritic steels and austinitic steels. Results of room-temperature mechanical tests and creep tests on bars and forgings enable comparisons to be made of the intrinsic properties of the various materials and provide information on the variation in properties with size (Q general, Q3, SS, AY)

504-Q. Study of the Properties of a Chromium-Nickel-Niobium Austenitic Steel. H. W. Kirkby and C. Sykes. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 95-106.

Properties of wrought 18-10 Cr-Ni steel (stabilized with columbium), with particular reference to high-temperature applications. Creep properties, tensile properties, and fatigue properties. Various metallographical aspects of the 18-10 type of austenitic steel. Factors which may influence the shape of the creep curves. 11 ref. (Q3, Q7, Q27, SS)

505-Q. Creep-Resisting Ferritic Steels. E. W. Colbeck and J. R. Rait. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 107-124.

One of the outstanding materials

of this type, namely, the 3% Cr-Mo-W-V alloy steel, was studied in detail. Influence of composition, constitution, and heat treatment on the creep properties. It is believed that at least three other steels with 0, 1.0, and 10.0% Cr, with excellent creep properties, will become available in the near future. 16 ref. (Q3, AY)

506-Q. Ferritic Steels for Gas Turbines. H. H. Burton, J. E. Russell, and D. V. Walker. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 125-134.

Test results on three ferritic creep resisting steels, mainly of the 3% Cr-Mo-W-V type, are presented, the test specimens being taken from forged disks as well as from bars. The effect of variations in treatment and mechanical properties on the creep properties was investigated, and data on the effective modulus of elasticity at test temperatures are given. The results are compared in the light of requirements for materials for turbine discs in aircraft gas turbines. (Q3, AY)

507-Q. Special Steels for Gas Turbines. W. E. Bardgett and G. R. Bolsover. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 135-148.

Data on a steel containing Ni, Cr, Mo, Co, Cb, W, and Ti tested both for creep and for general mechanical properties, with different amounts of hot work, and tested transversely and longitudinally. Properties of a 25% Cr, 15% Ni steel, suitable for combustion chambers. A steel containing about 20% Cr, 30% Ni, and 1% Ti is also suitable for combustion chambers and shows good creep resistance at certain temperatures. (Q general, AY)

508-Q. Fatigue at High Temperatures. H. J. Tapsell. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 169-174.

General characteristics of the behaviour of metals in fatigue. Effect of plastic strain in modifying the stress distribution under bending conditions. Shows that cyclic speed of stressing is an important factor. Experimental fatigue and creep data are given for some turbine blade materials, and the method of correlating these data in working stress diagrams is shown. (Q7, SG-h)

509-Q. Fatigue Tests at Elevated Temperatures. P. H. Frith. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 175-181.

Tests were carried out on hollow test pieces with reversed bending stresses, and with reversed bending stresses superimposed on a static tension or static bending stress. A few tests were carried out on turbine blades with reversed bending stresses. (Q7, SG-h)

510-Q. Hot Fatigue Testing. H. E. Gresham and B. Hall. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 181-185.

Construction of a simple single-point loading fatigue machine are given; construction of the furnace, and temperature measurement. The adaptability of the apparatus is illustrated by its use for corrosion-fatigue testing with corrosion media in the form of gases, solids, or as a spray. Specific research items in which this apparatus has proved useful are discussed. (Q7)

511-Q. Variation of Elastic Moduli With Temperature for Various Steels and Pure Metals. G. T. Harris and M. T. Watkins. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 185-188.

Determinations of Young's modulus for several gas-turbine materials and a few pure metals, at temperatures up to 800° C., were made by static and dynamic methods. In general the values determined by the two methods agree within 1%. The variation with temperature of the modulus of rigidity and Poisson's ratio was determined for two steels. 16 ref. (Q21, Fe, Al, Ni, ST)

512-Q. Some Cobalt-Rich Alloys for High-Temperature Service. J. C. Chaston and F. C. Child. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 246-248.

Stress-to-rupture characteristics at 900° C. of some alloys in the Ta-Cr-Co system were examined, particular attention being given to the influence of C on the creep endurance and microstructure of alloys containing 10% Ta and 10% Cr. (Q4, SG-h, Co)

513-Q. Three Improvements in Heat Resistant Alloys. (In French.) L. Colombier. *Métaux: Corrosion-Industries,* v. 26, May 1951, p. 218-223.

The prevention of slip by structural hardening, i.e., by formation of submicroscopic precipitates can be prevented by preliminary cold working, thus producing a rigidity up to 850° C. for some alloys. Usual techniques of forging and rolling are not applicable to some alloys, which can only be obtained by casting. (Q24, SG-h)

514-Q. Heat Resistant Aluminum Alloys. (In French.) R. Chevigny and R. Syre. *Métaux; Corrosion-Industries,* v. 26, May 1951, p. 224-232.

Factors which effect creep in light alloys, characteristics of alloys at high temperatures, and improvement of light alloys. (Q3, Al)

515-Q. Causes of Rupture of Mill Rolls. (In French.) M. R. Edelbloude. *Circulaire d'Informations Techniques,* v. 8, No. 3, 1951, p. 297-298, 300.

Suggestions for avoiding various types of rupture. Proposes methods for prolonging life of mill rolls. Types of mill rolls and their characteristics. (Q26, T5)

516-Q. Creep Testing Viewed as a Physico-Thermal Procedure. (In French.) Pierre Chevenard and Xavier Waché. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, June 11, 1951, p. 2161-2164.

If "elongation-time" curves have sufficient resolution to allow determination of rate by graphic means, then the method is applicable to study of physicochemical reactions and structures which occur in heat resistant alloys during use in thermal apparatus. (Q3, ST)

517-Q. Testing Fatigue in Electric Arc Welded Joints. (In French.) H. Dutilleul. *Soudure et Techniques connexes,* v. 5, May-June 1951, p. 97-104; disc., p. 104-108.

Behavior of welded and riveted assemblies is compared. Various types of joints were examined, and experimental evidence is used to determine particular points which should be emphasized. (Q7, K1)

518-Q. The Rupture of Steel Pieces. (In French.) A. Pignot. *Chaleur & Industrie,* v. 32, May 1951, p. 126-132; June 1951, p. 162-172.

Discusses the literature, influence of inclusions and corrosion, propagation of fissures, and control of pieces under pressure. (Q26, ST)

519-Q. Study of Internal Tensions Producing by Rolling. (In French.) Hans Bühler. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 299-302.

Nature and means of elimination. 12 ref. (Q25, F23, ST)

520-Q. Mechanical Properties Obtained by Isothermal Quenching. (In French.) R. Potaszkin and M. Jaspart. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 314-327.

(Q general, J26, AY)

521-Q. Determination of Tendency to Failure During Creep Under Multiaxial Tension After Preliminary Cold Working. (In French.) W. Siegfried. *Revue de Métallurgie,* v. 48, June 1951, p. 413-433.

Effect of preliminary cold working on the mechanical properties of steel during creep, effect of multiaxial tension on resistance, and some practical applications. (Q3, ST)

522-Q. Certain Aspects of Slip Produced by Alternating Stresses in Annealed Aluminum Crystals. (In French.) Paul-Henri Laurent. *Revue de Métallurgie,* v. 48, June 1951, p. 441-446.

Appearance of two very highly laced networks, lines of slip, and grouping of slips into wide-spaced bands were studied. In the examples studied, the grain has two directions of slip which mutually block, or depending on the case, do not interfere with each other. These slips develop in periodic order within the grain. Photomicrographs included. (Q24, Al)

523-Q. Performance and Evaluation of the Static Stress Test. (In German.) W. Späth. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, June 1951, p. 177-181.

Principles of test and determination of static stress, including a definition of limit of elasticity. A tensile test, an orienting experiment, and definition of strength values are also discussed. (Q27)

524-Q. The Effect of Test Load and Cold Working on Microhardness. (In German.) F. Vitovec. *Berg-und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben,* v. 96, June 1951, p. 133-136.

Shows that decrease of microhardness with increasing load does not contradict Kick's law of similarity, since deformed volume of sample material is not proportional to displaced volume of substance; also that a distinction must be made between a zone that has almost maximum hardness, and a transition zone whose thickness is little affected by the depth of penetration, but rather by the degree of deformation. 18 ref. (Q29, Fe)

525-Q. Effect of Material and Manufacturing Requirements on the Durability of Steel Materials. (In German.) O. Kropf. *Berg und Hüttenmännische Monatshefte der Montanistischen Hohschule in Leoben,* v. 96, July 1951, p. 151-156.

Investigations on durability of steel-mill ingots. 19 ref. (Q23, ST)

526-Q. Internal Stresses Developed During the Continuous Casting of Aluminum. (In German.) G. Seeger. *Giesserei,* v. 38, July 12, 1951, p. 325-329.

Stresses are studied by systematically separating continuous cast bars, and measuring sections cut off. From the stress distribution, con-

clusions about heat removal and contraction may be drawn. The degree of internal stress depends not only on method of cooling and cross-section of bar, but also on the plasticity limit of the cast bar. (Q25, C5, Al)

527-Q. The Strength of Teeth Surfaces of Straight-Toothed Spur Gears of Steel. (In German.) G. Niemann and H. Glaubitz. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, Feb. 21, 1951, p. 121-126.

Strength of teeth surfaces is primarily a question of resistance to rolling and pitting. Wöhler lines for gears of different steels and effect of oil viscosity and surface condition of teeth on durability of gears were determined. (Q23, T7, ST)

528-Q. Testing Machines. (In German.) H. Mintrop. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, June 21, 1951, p. 578-583.

Different types of modern mechanical testing machines used for testing miscellaneous materials. 99 ref. (Q general)

529-Q. Creep-Stress Resistance of Molybdenum, Chromium-Molybdenum, and Chromium-Molybdenum-Vanadium Steels. (In German.) Erich Theis. *Stahl und Eisen,* v. 71, June 7, 1951, p. 619-624.

Seven steels, annealed at different temperatures, were tested for yield point, tensile strength, elongation, contraction of area, and notch-impact toughness at room temperature and at 500° C. Notched and unnotched bars of same steels were subjected to creep stresses up to 30,000 hr. at 500° C. (Q3, AY)

530-Q. Effect of Method of Notching on the Notch-Impact Toughness of Unalloyed Steels. (In German.) Michael Hansen. *Stahl und Eisen,* v. 71, June 21, 1951, p. 686-687.

Method of machining notches greatly affects the results of a notch-impact test. (Q6, CN)

531-Q. Study of the Bauschinger Effect in the Torsion of Wires. (In German.) Paul Rahlfs and Georg Masing. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 454-459.

Investigated with aid of torsion tests of Fe, brass, tin-bronze, Cu, Al, and Al alloys. Results show that the Bauschinger effect is accompanied by a hardening effect. Method of experimentation. (Q24, Q1, Fe, Zn, Cu, Al)

532-Q. A Method of Determining the Total State of Deformation From an X-Ray Recording. (In German.) Günter Kemmnitz. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 492-496.

New method of determining main stresses by the back-reflection process; methods of computing significant angles; of determining the direction of main stress, and of calculating the accuracy of the method. 10 ref. (Q24)

533-Q. Phenomena Occurring in Continuously and Alternatingly Stressed Metal Structures. III. The Size of Notched and Unnotched Bars as a Factor in Fatigue Stress Reduction. (In German.) Cord Petersen. *Zeitschrift für Metallkunde,* v. 42, June 1951, p. 161-170.

A simplified formula for effect of stress reduction on fatigue strength of bars is derived and it is shown to agree with experimental results more closely than any other formula. Theory of "substitute" notch is illustrated and further developed. Formula is derived from this theory. 23 ref. (Q7, ST)

534-Q. Some Studies of Steels Under Pure Static Bending Stress. (In German.) Rudolf Böklen. *Zeitschrift für Metallkunde,* v. 42, June 1951, p. 170-174.

X-ray studies, mechanical-expansion measurements and studies of beginning and form of first flow lines on annealed and bent flat bars. These studies reveal differences in behavior of carbon steel and Cr-Mo steel. Observations are explained, and X-ray measurements indicate that strain coefficients of tension and compression are practically alike. 14 ref. (Q5, CN, AY)

535-Q. Determining Tensile Strength From Hardness of Aluminum Alloys. (In German.) Hermann Meincke. *Zeitschrift für Metallkunde,* v. 42, June 1951, p. 175-181.

Effect of crystal orientation, rolling, drawing, and forging, on tensile strength and hardness were investigated. Accurate measurements require removal of plating on Al or its alloys. A conversion factor of 0.364 yields positive correlation, with maximum deviation of 7.2%. Yield points computed from hardness are found to deviate up to 35%. (Q27, Q29, Al)

536-Q. Casting Surface: Volume Ratio Predicts Gray Iron Properties. F. W. Kellam and H. H. Fairfield. *American Foundryman,* v. 20, Aug. 1951, p. 30-32.

A simple reference chart, from which strength, hardness, and machinability can be predicted for each grade of gray iron, cast in any section thickness, was plotted from data obtained by pouring step blocks in the various irons. Properties of the iron are classified on the basis of the surface-to-volume ratio rather

than on the section thickness of the casting. 11 ref. (Q23, Q29, G17, CI)

537-Q. Correlation of Laboratory Tests and Service Performance. M. F. Garwood, H. H. Zurburg, and M. A. Erickson. *American Society for Metals,* "Interpretation of Tests and Correlation With Service," 1951, p. 1-77.

Shows that a definite correlation between laboratory tests and service performance of automotive components exists. Conclusive evidence that results of laboratory tests, providing they are properly selected, performed, and interpreted, do yield a fairly accurate prediction of performance. The tests were mainly fatigue and tensile, on laboratory specimens and on component parts. Effects of surface finish, stress concentrations, shot peening, and decarburization were evaluated. Materials were carbon and 10w-alloy steels. 17 ref. (Q7, Q27, S21, CN, AY)

538-Q. Limitations of Mechanical Testing. M. Gensamer. *American Society for Metals,* "Interpretation of Tests and Correlation With Service," 1951, p. 78-87.

Indicates belief that there are very few problems involving the mechanical behavior of metals that cannot be handled by mechanical testing, rather than relying wholly on service performance. (Q general, S21)

539-Q. Wear Tests and Service Performance. J. T. Burwell. *American Society for Metals,* "Interpretation of Tests and Correlation With Service," 1951, p. 88-140.

Main types of wear discussed are cutting, abrasive, galling, corrosive, and wear caused by pitting fatigue. Minor types of wear and effect of hardness. Applications to journal bearing; cylinders, and piston rings, gear teeth, lathe beds, dies and cutting tools, inspection fixtures, and excavating and similar equipment. Wear test apparatus. 65 ref. (Q9)

540-Q. Creep of Metals. Earl R. Parker. *American Society for Metals,* "High Temperature Properties of Metals," 1951, p. 1-40.

Mechanisms of deformation, creep theories, metallurgical factors, creep properties of various metals and alloys, effect of environment, and trends in the development of creep-resistant materials. 84 ref. (Q3)

541-Q. Stress Rupture Testing. N. J. Grant. *American Society for Metals,* "High Temperature Properties of Metals," 1951, p. 41-72.

Apparatus and procedure, role of the test, ways of plotting the data, the concept of "equi-cohesive temperature", metallurgical factors, theoretical aspects, role of ductility in stress-rupture testing, constant stress or strain-rate testing, combining creep and stress-rupture testing, minimum creep rate, and advantages of stress-rupture testing. 24 ref. (Q4, Q3)

542-Q. High Temperature Fatigue Testing. H. J. Grover and Howard C. Cross. *American Society for Metals,* "High-Temperature Properties of Metals," 1951, p. 73-92.

Experimental techniques peculiar to testing materials under repeated stresses at high temperatures. Factors of major importance to be considered. (Q7)

543-Q. Electrically Excited Resonant-Type Fatigue Testing Equipment. Thomas J. Dolan. *ASTM Bulletin,* July 1951, p. 60-67; disc., p. 67-68.

A new fatigue testing machine, operated and controlled by simple electrical circuits. The majority of the electrical components employed are composed of standard commercially available equipment. Loads are applied by inertia forces from two heavy masses between which is suspended the test specimen. The system operates as a "tuning fork" which subjects the test specimen to vibratory bending stresses. Advantages and adaptability of the equipment for other uses. Preliminary results from flexural fatigue tests of round and square specimens of 24S-T4 Al alloy. (Q7, Al)

544-Q. Chart Correlates Rockwell C and Filar Units. *Iron Age,* v. 168, Aug. 16, 1951, p. 107.

A chart for conversion of Tukon hardness test data to Rockwell hardness values. (Q29)

545-Q. What is the Strength of Aluminum After Forming? L. V. Omelka and D. A. Paul. *Iron Age,* v. 168, Aug. 16, 1951, p. 112-114.

Data on the strength of Al alloys after forming show that 52S increases most in yield strength and ultimate strength as metal is stretched during forming. K-150 is next, followed by 3S and 2S. The rate of work hardening of 52S is also high. K-150 shows greatest percentage of yield strength increase for a given amount of stretch. (Q23, G9, Al)

546-Q. Fatigue of Coiled Springs; Tests on Heavy Silicon-Manganese Steel Tank Components. W. E. Bardgett and F. Gartside. *Iron and Steel,* v. 24, Aug. 1951, p. 375-379.

Details of construction of special equipment designed for fatigue tests of coiled springs. Effects of various production factors were determined. (To be continued.) (Q7, AY)

547-Q. Grain Boundaries and Creep. S. G. Glover. *Journal of the Birming-*

ham Metallurgical Society, v. 31, June 1951, p. 61-74.

Theories of grain boundaries. Methods and difficulties of experimental investigation; indicates the concept of the boundary structure which has emerged. 28 ref. (Q3, M27)

548-Q. The Internal Friction of Metals, Its Measurement and Its Applications to the Problems of Physical Metallurgy. Bryan Edmondson. *Journal of the Birmingham Metallurgical Society,* v. 31, June 1951, p. 75-104.

A non-mathematical description of the causes of the phenomenon. Methods of measurement of internal friction, and effects of experimental variables on the values obtained. 23 ref. (Q22)

549-Q. Internal Friction and Grain-Boundary Viscosity of Tin. L. Rotherham, A. D. N. Smith, and G. B. Greenough. *Journal of the Institute of Metals,* v. 79, Aug. 1951, p. 439-454.

Internal friction of high-purity Sn was studied between 15 and 150° C. by measurements made on bars vibrating transversely at audio frequencies in the "free-free" mode. Both polycrystalline specimens and bars consisting of a very few crystals were examined. A peak in the curve of internal friction vs. temperature, ascribed to viscous relaxation at the grain boundaries, was found to exist for the former type, but not for the latter. The activation energy associated with the relaxation was measured, and is consistent with that for steady-state creep of single crystals, but differs greatly from the value for self-diffusion in tin. This is contrary to a theory proposed by K_e that all three values should be the same. Variation of Young's modulus with temperature was observed over the same range for both types of specimen. 15 ref. (Q22, Q3, N1, Sn)

550-Q. Roller Levelling of Magnesium Alloy Sheet. E. A. Calnan and A. E. L. Tate. *Journal of the Institute of Metals,* v. 79, Aug. 1951, p. 455-464.

It has been widely suggested that loss of proof stress in Mg alloy sheet after roller leveling is due to untwinning of material twinned by bending in the roller-leveling process. Presents X-ray diffraction evidence of additional twinned material in roller-leveled sheet. Concludes that loss in proof stress can be avoided by leveling in the [1010] direction when this has a specific direction in the sheet. From investigation of influence of previous heat treatments and deformation, it was found that previous cold working reduces loss in proof stress on roller leveling. (Q24, F29, Mg)

551-Q. Plastic Deformation of Chromium-Plated Steel for Aircraft. Hugh L. Logan. *Metal Finishing,* v. 48, Aug. 1951, p. 53, 60. *Journal of Research of the National Bureau of Standards.*

Previously abstracted from "Effect of Chromium Plating on the Plastic Deformation of SAE 4130 Steel." See item 358-Q, 1951. (Q24)

552-Q. 885° F. Embrittlement of the Ferritic Chromium-Iron Alloys. J. J. Heger. *Metal Progress,* v. 60, Aug. 1951, p. 55-61.

Phenomenon, which occurs on cooling through approximately 885° F. after long periods at higher temperatures. It is characterized by an increase in hardness, tensile strength, and yield strength, and by a decrease in ductility and impact strength. Changes in electrical resistance, density, magnetic properties, and corrosion resistance also occur. Effects of alloying elements. Mechanism of the embrittlement in pure and commercial Fe-Cr alloys. (Q23, SS)

553-Q. Investigation of the Fatigue Strength of Full-Scale Airplane Wing Structures. Dwight O. Fearnow. *National Advisory Committee for Aeronautics,* Research Memorandum L51D13a, July 13, 1951, 20 pages.

Tests were conducted by the resonant-frequency method, wherein concentrated masses were attached to the wing to reproduce flight stresses corresponding to load-factor values of 1 ± 0.625 g. over approximately 45% of the span. Spar material was 24S-T Al alloy. Skin and stiffener material was Alclad 24S-T. Other material was 24S-T. (Q7, Al)

554-Q. Effects of Design Details on the Fatigue Strength of 355-T6 Sand-Cast Aluminum Alloy. M. Holt and I. D. Eaton. *National Advisory Committee for Aeronautics,* Technical Note 2394, July 1951, 45 pages.

Static and fatigue tests were made on specimens of the alloy incorporating holes, bosses, and ribs. In terms of average stress on the minimum net section of one specimen of each type, all the design details studied reduced static strengths of the plate-type specimens by 13-26%. (Q7, Al)

555-Q. A Critical Review of Notch Sensitivity in Stress-Rupture Tests. W. F. Brown, Jr., and George Sachs. *National Advisory Committee for Aeronautics,* Technical Note 2433, Aug. 1951, 29 pages.

English and German literature on notch stress-rupture testing was reviewed and information obtained on effect of notching on rupture strength in general and, in particular, the influence of unnotch duc-

tility on notch sensitivity; rupture characteristics of low-alloy, heat resisting steels; mechanism of stress-rupture embrittlement and notch sensitivity in these low-alloy steels; and comparative influence of notch geometry on notch strength in stress-rupture and in conventional tensile tests. 17 ref. (Q23, AY, SG-h)

556-Q. On the State of Stress in a Plastic-Rigid Body at the Yield Point. R. Hill. *Philosophical Magazine,* ser. 7, v. 42, Aug. 1951, p. 868-875.

Yield point of a plastic-rigid body is defined as the moment when deformation first becomes possible as load is increased. Practical significance of yield-point load for an actual plastic-elastic body. Shows that part of the plastic zone at the yield point, namely the part where deformation occurs, depends only on current surface stresses and not on the previous loading program. Recent American work on plastic limit design of structures is critically reviewed. (Q23)

557-Q. A Theoretical Investigation of the Compression of a Ductile Material Between Smooth Flat Dies. A. P. Green. *Philosophical Magazine,* ser. 7, v. 42, Aug. 1951, p. 900-918.

A 2-dimensional theory is suggested to describe the distribution of stress and velocity in a block of ductile material symmetrically indented on opposite sides by two smooth flat dies. Slip-line fields are proposed for all ratios of width of dies to height of block greater than one. It was found that the velocity field transforms into its corresponding slip-line field. Other plane-plastic problems where this correspondence occurs are cited. Similar fields are proposed for extrusion or drawing through a wedge-shaped die with large reductions. 16 ref. (Q28, Q24)

558-Q. The Development of Deformation Textures in Metal. Part III. Hexagonal Structures. E. A. Calnan and C. J. B. Clews. *Philosophical Magazine,* ser. 7, v. 42, Aug. 1951, p. 919-931.

How the effect of twinning may be introduced into the treatment already developed for face-centered and body-centered cubic metals. How this treatment may be applied to the prediction of deformation textures in hexagonal metals. Good agreement with observed textures was obtained for both Mg and Zn hexagonal metals characteristic of those having axial ratios respectively less and greater than the ideal close-packed value. 17 ref. (Q24, Mg, Zn)

559-Q. The Properties of Cast Iron at Sub-Atmospheric Temperatures. G. N. J. Gilbert. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A52-A75; disc., p. A75-A76.

Previously abstracted from *Institute of British Foundrymen* (Paper No. 964). See item 565-Q, 1950. (Q23, N8, CI)

560-Q. Sand-Cast Test-Bars for Copper-Base Alloys. O. R. J. Lee and B. W. Peck. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A104-A107; disc., p. A107-A109.

Previously abstracted from *Institute of British Foundrymen* (Paper No. 967); also from *Foundry Trade Journal.* See item 566-Q, 1950. (Q general, E11, Cu)

561-Q. Deformation Characteristics of Five Grey Cast Irons at 400 and 500 Deg. C. C. R. Tottle. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A162-A170; disc., p. A170-A173.

Previously abstracted from *Institute of British Foundrymen* (Paper No. 973). See item 567-Q, 1950. (Q3, Q4, CI)

562-Q. Testing the Metal or Testing the Casting. Erik O. Lissell. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A202-A217; disc., p. A217-223.

Previously abstracted from Institute of *British Foundrymen* (Paper No. 976). See item 568-Q, 1950. (Q general, S22, CI)

563-Q. Choosing Metals for Low Temperature Use. John R. Watt. *Refrigerating Engineering,* v. 59, Aug. 1951, p. 751-754.

Effects of temperatures used in refrigeration on mechanical properties of irons and steels. Rules for selection. 10 ref. (Q general, Fe, ST)

564-Q. ISTC Division VIII Reports on Boron Steels. Harry B. Knowlton, editor. *SAE Journal,* v. 59, Aug. 1951, p. 17-31.

First of a series digesting the information presented at the meetings of the above group. General information on boron steels together with reports of users' experiences with the carburizing grades. Following an introductory section are "Data on 80B20, 94B20, 86B15, and 10T35 (now 14B35)," W. E. Jominy; "Report on 50B20 and 41B18," H. B. Knowlton and D. C. McVey; "Data on 80B20," B. L. Johnson and W. E. Day, Jr.; "Data on 43B17, 46B20, and 94B20," W. E. Day, Jr.; and "Data on 43B10," J. C. Mertz. Concerned largely with mechanical properties and hardenability. (Q general, J26, AY, B)

565-Q. An Introduction to Arc-Cast Molybdenum and Its Alloys. J. L. Ham. *Transactions of the American Society of Mechanical Engineers,* v. 73, Aug. 1951, p. 723-731; disc., p. 731-732.

The general properties of unalloyed cast molybdenum, curves show the room-temperature tensile properties, hardness, and notched-bar values after annealing at various temperatures, the effect of testing temperature on hardness, and the transition temperatures for various types of impact tests. The need for addition of alloying elements. The effects of several of the alloying elements on the rate of work hardening and on the temperatures of softening and recrystallization were studied using a series of alloys which were extruded. 10 ref.
(Q general, N5, Mo)

566-Q. Nickel-Chromium-Molybdenum Steel Valve Casting After 50,000 Hours of Service at 900 F. T. N. Armstrong and R. J. Greene. *Transactions of the American Society of Mechanical Engineers,* v. 73, Aug. 1951, p. 751-753; disc., p. 753-754.

Test results indicate that there was no loss of strength, no embrittlement, and no formation of graphite in the valve. (Q23, N8, S21, AY)

567-Q. Nickel-Aluminum-Molybdenum Alloys for Service at Elevated Temperatures. H. V. Kinsey and M. T. Stewart. *Transactions of American Society for Metals,* v. 43, 1951, p. 193-219; disc., p. 219-225.

Previously abstracted from *American Society for Metals.* Preprint 12, 1950. See item 728-Q, 1950.
(Q general, Ni, SG-h)

568-Q. Long-Time Elevated Temperature Test of Chromium-Molybdenum Steels. A. B. Wilder and J. O. Light. *Transactions of American Society for Metals,* v. 43, 1951, p. 323-336; disc., p. 336-341.

Stability of over 100 different types of steel at 900, 1050, and 1200° F. is being evaluated over a period of 10 years. Welded samples are included in the investigation. Results obtained in an examination of 35 of the Mo-bearing steels for evidence of structural changes, oxidation characteristics, and impact properties after exposure for 10,000 and 34,000 hr. Typical C-Mo, Mo-V, Cr-Mo, and Cr-Mo-V steels were investigated. Some of the material was obtained from commercial pipe.
(Q6, R2, N8, AY, SS)

569-Q. Effect of Reheat Treatment on Transverse Ductility in Wrought Steel Products. Paul E. Busby, Charles V. Klimas, and Cyril Wells. *Transactions of American Society for Metals,* v. 43, 1951, p. 526-546.

Effect of a retemper and a requench and temper treatment on transverse reduction of area quality of quenched and tempered forgings and seamless tubes was investigated. A typical composition is SAE 4335. Results indicate that, at a given yield strength, a retemper or a requench and temper, usually improves transverse reduction of area quality only slightly, if at all. However, increase in percentage of acceptance of forgings or seamless tubes may be quite large.
(Q23, J29, AY)

570-Q. Notched and Unnotched Tensile and Fatigue Properties of Ten Engineering Alloys at 25° C. and −196° C. J. W. Spretnak, M. G. Fontana, and H. E. Brooks. *Transactions of American Society for Metals,* v. 43, 1951, p. 547-570.

The materials studied were: 24S-T and 75S-T Al alloys, FS-1 Mg alloy, SAE 2330 steel, NE(SAE)8630 steel, 18-8S stainless steel, titanium, Hy-Tuf steel, and SAE 4340 steel. Vickers hardness and Charpy keyhole impact strength of these materials were determined at room temperature and at temperatures down to −253° C.
(Q27, Q7, Al, Mg, AY, SS, Ti)

571-Q. The Influence of Temperature Upon the Time Delay for Yielding in Annealed Mild Steel. D. S. Wood and D. S. Clark. *Transactions of American Society for Metals,* v. 43, 1951, p. 571-586.

Results of an experimental investigation of the time required for initiation of plastic deformation in an annealed low-carbon steel subjected to rapidly applied tensile stress at four temperatures. A well-defined period of time was found to elapse between the instant the stress reaches its full value and the instant plastic deformation begins. This "delay time" was measured as a function of the applied stress at −75, 73, 150, and 250° F. Shows that temperature dependence of delay time cannot be adequately described by a simple thermal-activation function of the form $t = e^{Q/RT}$. (Q23, CN)

572-Q. The Effect of Cold Rolling on the Creep Properties of Several Aluminum Alloys. O. D. Sherby and J. E. Dorn. *Transactions of American Society for Metals,* v. 43, 1951, p. 611-634.

Creep and stress rupture properties of the following alloys were obtained for 90, 212, 300, and 400° F. up to 1000 hr. rupture time: 99.6% Al, H12 and H18 tempers; 2S, H12 and H18 tempers; 4S, H32 and H38 tempers. (Q3, Q4, Al)

573-Q. Effect of Strain Rate on Toughness of Temper-Brittle Steel. D. C. Buffum and L. D. Jaffe. *Transactions of American Society for Metals,* v. 43, 1951, p. 644-648; disc., p. 648-650.

Previously abstracted from *American Society for Metals*, Preprint 22, 1950. See item 730-Q, 1950. (Q25, AY)

574-Q. Grain and Grain-Boundary Compositions: Mechanism of Temper Brittleness. J. W. Spretnak and Rudolph Speiser. *Transactions of American Society for Metals*, v. 43, 1951, p. 734-748; disc., p. 748-758.

Previously abstracted from *American Socicty for Metals*, Preprint 21, 1950. See item 729-Q, 1950. (Q23, P13, AY, CN)

575-Q. The Influence of Chromium on the Mechanical Properties of Plain Chromium Steels. W. O. Binder and Howard R. Spendelow, Jr. *Transactions of American Society for Metals*, v. 43, 1951, p. 759-772; disc., p. 772-777.

Previously abstracted from *American Society for Metals*, Preprint 23, 1950. See item 731-Q, 1950. (Q general, N8, AY, Cr)

576-Q. Rheotropic Embrittlement of Steel. E. J. Ripling and W. M. Baldwin, Jr. *Transactions of American Society for Metals*, v. 43, 1951, p. 778-805; disc., p. 806-810.

Previously abstracted from *American Society for Metals*, Preprint 24, 1950. See item 732-Q, 1950. (Q23, AY)

577-Q. Embrittlement of Stainless Steel by Steam in Heat Treating Atmospheres. C. A. Zapffe and R. L. Phebus. *Transactions of American Society for Metals*, v. 43, 1951, p. 811-821; disc., p. 822-823.

Previously abstracted from *American Society for Metals*, Preprint 25, 1950. See item 733-Q, 1950. (Q23, J2, SS)

578-Q. Fracturing of Silicon-Ferrite Crystals. C. F. Tipper and A. M. Sullivan. *Transactions of American Society for Metals*, v. 43, 1951, p. 906-928; disc., p. 929-934.

Previously abstracted from *American Society for Metals*, Preprint 30, 1950. See item 734-Q, 1950. (Q24, Fe)

579-Q. Fractographic Registrations of Fatigue. C. A. Zapffe and C. O. Worden. *Transactions of American Society for Metals*, v. 43, 1951, p. 958-969; disc., p. 969.

Previously abstracted from *American Society for Metals*, Preprint 32, 1950. See item 735-Q, 1950. (Q7, M23, Al, CN, AY)

580-Q. The Stress-Strain Energy Relationship for Metals. D. J. McAdam, Jr. *Transactions of American Society for Metals*, v. 43, 1951, p. 970-992.

Previously abstracted from *American Society for Metals*, Preprint 34, 1950. See item 737-Q, 1950. (Q23, Cu)

581-Q. Tension-Compression Biaxial Plastic Stress-Strain Relations for Aluminum Alloys 24S-T and 2S-O. Joseph H. Faupel and Joseph Marin. *Transactions of American Society for Metals*, v. 43, 1951, p. 993-1012.

Previously abstracted from *American Society for Metals*, Preprint 35, 1950. See item 738-Q, 1950. (Q23, Al)

582-Q. Strain Hardening of Mild Steel in the Torsion Tests as a Function of Temperature. Hugo Larson and E. P. Klier. *Transactions of American Society for Metals*, v. 43, 1951, p. 1033-1050; disc., p. 1050-1051.

Previously abstracted from *American Society for Metals*, Preprint 37, 1950. See item 739-Q, 1950. (Q1, CN)

583-Q. Statistical Analysis of the Effect of Alloying Elements on Mechanical Properties of Seamless Steel Tubes. W. T. Rogers. *Transactions of American Society for Metals*, v. 43, 1951, p. 1126-1137; disc., 1137-1143.

Previously abstracted from *American Society for Metals*, Preprint 41, 1950. See item 740-Q, 1950. (Q23, S12, AY)

584-Q. Effect of Alloying Elements on Notch Toughness of Pearlitic Steels. J. A. Rinebolt and W. J. Harris, Jr. *Transactions of American Society for Metals*, v. 43, 1951, p. 1175-1201; disc., p. 1201-1214.

Previously abstracted from *American Society for Metals*, Preprint 33, 1950. See item 736-Q, 1950. (Q23, ST)

585-Q. The Stress-Strain Energy Relationship for Aluminum. D. J. McAdam, Jr. *Transactions of American Society for Metals*, v. 43, 1951, p. 1215-1245.

Stress-strain energy relationship for some metals that are subject to strain aging. Although chief attention is given to Al alloy 2S, containing 99.4% Al, some attention is given to high-purity Al, duralumin 24S-T, and other metals. Curves were derived to represent influence of temperature on stress-strain relationship for constant intrinsic strength and for influence of temperature and plastic strain on total strain energy, work hardening energy, and latent energy of Al. 28 ref. (Q23, Al)

586-Q. The General Tensional Relaxation Properties of a Bolting Steel. D. N. Frey. *Transactions of the American Society of Mechanical Engineers*, v. 73, Aug. 1951, p. 755-760; disc., p. 760.

Above properties of a Cr-Mo-Si-V commercial high-temperature bolting steel at 1000° F. under varying conditions were investigated by means of the step-down relaxation test. (Q3, Q27, AY, SG-h)

587-Q. Connections for Welded Continuous Portal Frames. Progress Re-

port No. 4: Part II. Theoretical Analysis of Straight Knees. Lynn S. Beedle, A. A. Topractsoglou, and Bruce G. Johnston. *Welding Journal,* v. 30, Aug. 1951, p. 397s-405s.

Theoretical analysis for straight knees of a rigid-frame structure forming the basis for comparing experimental results with theory. Stresses rotations and deflections. (Q25, K1)

588-Q. Room Temperature Tensile Tests as an Index of Transition Temperature of Steel Plates. *Welding Journal,* v. 30, Aug. 1951, p. 405s-407s.

W. J. Harris, Jr., J. A. Rinebolt, and Richard Raring discuss above paper by S. S. Tor, R. D. Stout, and B. G. Johnston. (Sept. issue, 1950; item 650-Q, 1950.) (Q27, ST)

589-Q. Evaluating Notch Toughness. E. M. MacCutcheon, R. H. Lambert, J. E. Walker, and R. D. Schmidtman. *Welding Journal,* v. 30, Aug. 1951, p. 408s-414s.

Discusses above paper by R. W. Vanderbeck and M. Gensamer. (Jan. 1950 issue; item 71-Q, 1950.) (Q6, Q23)

590-Q. Testing the Tendency of Weldable Structural Steel Toward Brittle Fracture. E. Folkhard. *Welding Journal,* v. 30, Aug. 1951, p. 414s-415s.

Translated and condensed from *Stahl und Eisen.* See item 303-Q, 1951. (Q23, K9, CN)

591-Q. Relation Between the Heterogeneity of the Plastic Deformation of Iron and the Amount of Its Critical Cold Working; Application to the Formation of Single Crystals. (In French.) Michel Mourflard and Paul Lacombe. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, July 9, 1951, p. 174-176.

Studied for steel samples. (Q24, ST)

592-Q. Formation of Microscopic Cracks in Aluminum During Plastic Deformation. (In Russian.) V. A. Pavlov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser., v. 78, June 1, 1951, p. 677-679.

Small specimens of polycrystalline Al were subjected to uniaxial tension. Crack formation was studied microscopically. (Q24, Al)

593-Q. Cast Heat Resistant Alloys of the 21% Chromium-9% Nickel Type. Howard S. Avery, Charles R. Wilks, and John A. Fellows. *American Society for Metals,* Preprint 15, 1951, 24 pages.

Alloys are intended for 1200-1600° F. service. Room-temperature mechanical properties as-cast and after aging at 1400° F.; creep and creep-rupture properties from 1200 to 1600° F.; magnetic permeability after various thermal treatments; behavior in hindered thermal contractions; resistance to oxidation at elevated temperatures; hot-hardness variation with temperature; influences of thermal history on structure; and miscellaneous physical properties such as density, melting point, modulus of elasticity, and coefficients of thermal expansion. Comparisons with cast 26% Cr + 12% Ni ("HH"-type) alloys show superior aged ductility with equivalent creep strength and satisfactory oxidation resistance up to 1600° F. (Q general, R2, P general, SS, SG-h)

594-Q. Influence of Extended Time on Creep and Rupture Strength of 16-25-6 Alloys. C. L. Clark, M. Fleischmann, and J. W. Freeman. *American Society for Metals,* Preprint 16, 1951.

Experimental data for an alloy steel containing approximately 16% Cr, 25% Ni, and 6% Mo, in two conditions of heat treatment, for periods up to 12,000 hr. Electron-microscope structures showed the creep resistance to be due, in part at least, to a precipitation phenomenon which occurred during the creep tests. (Q3, Q4, SS, SG-h)

595-Q. Effect of Retained Austenite Upon Mechanical Properties. L. S. Castleman, B. L. Averbach, and Morris Cohen. *American Society for Metals,* Preprint 21, 1951, 17 pages.

Retained austenite contents of AISI 2340 steel specimens were determined by means of integrated X-ray intensities. It was found that retained austenite reduces elastic limit, yield strength, fracture stress, and energy absorption in tension, and also has an adverse effect on notched properties measured by a slow-bend test. The interplay of retained austenite, refrigeration, and tempering is discussed in terms of resulting mechanical properties. The most striking effect is its deleterious influence on elastic limit and yield strength. 11 ref. (Q general, J29, AY)

596-Q. Delayed Yield in Annealed Steels of Very Low Carbon and Nitrogen Content. D. S. Wood and D. S. Clark. *American Society for Metals,* Preprint 23, 1951, 17 pages.

Effect of the presence and near absence of C and N in an initially low-carbon steel upon the delayed-yield phenomenon. Rapid-load tensile tests were performed on a low-carbon steel after being treated in four different ways: annealed; wet-hydrogen-treated to remove the static upper yield point; wet-hydrogen-treated and recarburized; wet-hydro-

gen-treated and renitrided. Results show that all four materials exhibit delayed yielding and that the time delay is similarly affected by stress and temperature in all cases. (Q23, CN)

597-Q. The Determination of Flow Stress From a Tensile Specimen. E. R. Marshall and M. C. Shaw. *American Society for Metals,* Preprint 24, 1951, 16 pages.

An experimental study was made of the influence of neck-profile radius on the true stress-true strain tensile test. An increase in this radius lowered the true stress corresponding to a given strain. Effect of neck-profile radius was also examined with regard to fracture stress, and the results discussed in terms of several strength theories. The corrected true stress-true strain curve is applied to the cutting of metals. Hot-rolled SAE 4140 steel and electrolytic Cu were studied. 13 ref. (Q27, G17, AY, Cu)

598-Q. Fatigue Strength of Large, Notched Steel Bars Surface-Hardened by Gas Heating and By Induction Heating. S. L. Case, J. M. Berry, and H. J. Grover. *American Society for Metals,* Preprint 26, 1951. 17 pages.

Fatigue tests were made on large, notched, round bars of SAE 1045 steel, surface-hardened to various case depths by induction heating and by gas heating. Surface hardening the notch improved the fatigue strength in every instance. The improvement was greater the deeper the hardened case. For a particular case depth, the tests showed no significant difference in fatigue strength with difference in the method of heating employed. Results of metallographic examination and of some auxiliary static-bending tests. (Q7, J2, CN)

599-Q. Effect of High Heating Rate on Some Elevated Temperature Tensile Properties of Metals. W. K. Smith, C. C. Woolsey, Jr., and W. O. Wetmore. *American Society for Metals,* Preprint 27, 1951, 16 pages.

Method and equipment developed for determining tensile properties of metals when subjected to a constant load and heated at rates exceeding 100° F. per sec. until rupture. Stresses up to the ambient-temperature yield strength and heating rates up to 3500° F. per sec. were investigated. Test data are presented for AISI C-1020 and SAE 4130 steels, and for 14S-T6, 24S-T4, and 75S-T6 Al alloys. (Q27, CN, AY, Al)

600-Q. Interrelation of Mechanical Properties, Casting Size, and Microstructure of Ductile Cast Iron. R. Wayne Kraft and Richard A. Flinn. *American Society for Metals,* Preprint 33, 1951, 25 pages.

Cast iron with spheroidal graphite was evaluated from three aspects: variation in mechanical properties in castings of varying thickness, analysis, and heat treatment; correlation of properties with steels of the same matrices; and reproducibility of properties under commercial conditions. 13 ref. (Q general, E25, M27, CI)

601-Q. Aluminum—6% Magnesium Wrought Alloys for Elevated-Temperature Service. K. Grube and L. W. Eastwood. *American Society for Metals,* Preprint 35, 1951, 12 pages.

The above alloys have low density, good resistance to corrosion, and high tensile and yield strengths at elevated temperatures. Their resistance to creep at 600° F. is poor. Greatly improved resistance to creep can be obtained by adding 0.25% Cr and 0.10% Ti to the base metal. (Q general, Al, SG-h)

602-Q. A Study of the Microhardness of the Major Carbides In Some High Speed Steels. P. Leckie-Ewing. *American Society for Metals,* Preprint 36, 1951, 15 pages.

The major carbides in several high-V types of so-called "super high speed" steels as well as in representative grades of standard W and Mo-W high-speed steels were investigated with regard to microhardness of approximate relative quantities. Carbides were identified using the differential etches developed by Blickwede, Cohen, and Roberts. Microhardnesses were obtained with an Eberbach tester. (Q29, M21, TS, C-n)

603-Q. Creep as a Surface Dependent Phenomenon. Milton R. Pickus and Earl R. Parker. *American Society for Testing Materials,* "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 26-33.

Published research on effects of surface conditions on plastic flow of metals is briefly reviewed. These effects on secondary creep rates for zinc and "A" nickel were investigated. Both single-crystal and polycrystalline Zn were studied. Effects of Cu in the surface layer of Zn and of W in the Ni. (Q3, Zn, Ni)

604-Q. The Effect of Environment on the Stress-Rupture Properties of Metals at Elevated Temperatures. O. Cutler Shepard and Willis Schalliol. *American Society for Testing Materials,* "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 34-38; disc. p. 39-41.

Previously abstracted from *American Society for Testing Materials,*

Preprint 58, 1950. See item 479-Q, 1950. (Q4, Ni, CN)

605-Q. New Aluminum Casting Alloy for Higher Temperatures. *Automotive Industries,* v. 105, Sept. 1, 1951, p. 58, 90.

See abstract of "ML Aluminum Casting Alloy—A Material for Elevated Temperatures," J. C. McGee, *CADO Technical Data Digest.* (See item 453-Q, 1951). (Q general, Al, SG-h)

606-Q. Refinements Aid Metal Fatigue Studies. *Aviation Week,* v. 55, Sept. 3, 1951, p. 21, 23-24.

See abstract of "A Study of Fatigue in Metals by Means of X-Ray Strain Measurement", John A. Bennett, *Journal of Research of the National Bureau of Standards,* item 343-Q, 1951. (Q7, ST)

607-Q. Strain-Testing Railroad Bridges. A. D. M. Lewis. *Electronics,* v. 24, Sept. 1951, p. 117-119.

How dynamic strains in bridge floorbeam hangers are detected by means of resistance gages. Indication is made on cathode-ray tubes viewed by moving-film recording cameras using a 12-channel cathode-ray oscillograph. (Q25)

608-Q. Brittle Fracture of Mild Steel. T. S. Robertson. *Engineer,* v. 192, Aug. 31, 1951, p. 278-279.

Recent tests. The change from tough to brittle is determined by a number of features; however, temperature change has been adopted as the standard for investigation of transition in the fractures. (Q23, ST)

609-Q. Cleavage Fractures of Ship Plates. Wilbur M. Wilson, R. A. Hechtman and W. H. Bruckner. *Engineering Experiment Station, University of Illinois,* Bulletin Series 388, Mar. 1951, 95 pages. *(University of Illinois Bulletin,* v. 48, no. 50.)

Tests made to determine the factors that influence the formation of cleavage fractures in steel ship plates. Factors are character of the fracture, distribution across the plate of longitudinal strain, relation between load and average elongation, distribution of longitudinal strain outside the stress-raisers, transition temperatures, width of stress-raiser after failure, and thickness of plates. (Q26, ST)

610-Q. Effect of Boron on Cast Iron. William G. Wilson. *Foundry,* v. 79, Sept. 1951, p. 88-89, 164-165.

Although boron additions to gray iron have been limited principally to the production of rolling-mill rolls, studies indicate its adaptability to other castings, with consequent saving in scarce conventional alloys. Effects of boron on tensile strength, hardness, and chill depth are charted and tabulated. (Q23, Q29, B, CI)

611-Q. The Cold-Working of Metals. Cecil H. Desch. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 978-1003; disc., p. 1047-1093.

Elementary explanation of the theory of deformation of metals and its practical implications. (Q24)

612-Q. Microhardness of Constituents in Steel Tested. H. A. Unckel. *Iron Age,* v. 168, Aug. 30, 1951, p. 68-71.

Microhardness of ferrite, pearlite, and cementite in several commercial steels was determined by the Hanemann method. (Q29, ST)

613-Q. On Creep and Relaxation. III. B. Gross and H. Pelzer. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1035-1039.

The previous theory of linear reversible creep is extended and permanent (plastic) deformations are taken into consideration. General relations are established between the distribution functions of relaxation times of stress, and retardation times of strain. A particular type of distribution function is considered in detail. How the existence of a plastic component in creep affects the distribution function of relaxation times. (Q3)

614-Q. Internal Friction of Cold-Worked Single Crystals of Copper. Ryukiti Robert Hasiguti and Tadamasa Hirai. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1084-1085.

Results are compared with stress-strain curves. (Q22, Cu)

615-Q. Work-Hardening of Mild Steel by Explosive Attack. John S. Rinehart. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1086-1087.

Hardness data obtained from SAE 1020 steel plates, each of which had been acted upon by a thin layer of explosive detonated on the surface of the plate. (Q29, G23, CN)

616-Q. A Remark on the Composition Dependence of the Elastic Parameters of Beta-Brass. John S. Rinehart. *Journal of Applied Physics,* v. 22, Aug. 1951, p. 1089.

A recent investigation by Artman and Thompson reports a dependence of the elastic parameters of beta-brass on composition. Composition of the crystals used was determined and is presented in tabular form. (Q21, Cu)

617-Q. Fundamental Effects of Cold Working on the Creep Resistance of an Austenitic Alloy. D. N. Frey and J. W. Freeman. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and*

Metallurgical Engineers, v. 191, 1951, p. 755-760.

Fundamental reasons for the improvement in creep resistance of an austenitic alloy by cold working were investigated mainly by X-ray diffraction. Low-carbon N-155 alloy was studied. The creep resistance was found to be improved by the internal stresses in the lattice of the alloy induced by the cold work. (Q3, SS)

618-Q. Thermal Variation of Young's Modulus in Some Fe-Ni-Mo Alloys. M. E. Fine and W. C. Ellis. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 761-764.

Young's modulus and its temperature coefficient were investigated in low coefficient Fe-Ni-Mo alloys under varying conditions of working and annealing. The alloys studied contained 5-10% Mo and 38-43% Ni. In the ternary as well as the binary Fe-Ni alloys, the temperature interval of nearly constant Young's modulus is greatly extended by work hardening. A stress-relief anneal is necessary to stabilize the alloys. (Q21, Fe, Ni)

619-Q. Creep Behavior of Zinc Modified by Copper in the Surface Layer. Milton R. Pickus and Earl R. Parker. *Journal of Metals,* v. 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 792-796.

Results of investigation show the creep rate to be decreased by the presence of a thin Cu layer. Secondary creep rates for Zn in 4 different conditions were determined in the range 200-375° C. 15 ref. (Q3, Zn)

620-Q. Creep Characteristics of Some Platinum Metals at 1382° F. R. H. Atkinson and D. E. Furman. *Journal of Metals,* v. 3, Sept. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 806-808.

The creep rates of pure Pt, 90% Pt +10% Rh, and pure Pd at 1382° F. were determined using bars 0.290 in. in diam. and stresses of 150 to 550 psi. in tests lasting up to 3000 hr. The creep-rate curves of Pt were normal for stresses of 250 and 400 psi. The creep rate of 90% Pt + 10% Rh, provided it was given a brief high-temperature anneal (1 hr. at 1922° F.) for grain enlargement, was below that of pure Pt. (Q3, Pt, Pd)

621-Q. Deformation Texture of Body-Centered Cubic Metal Wires. W. R. Hibbard, Jr., A. E. Roswell, and A. E. Schuetz. *Journal of Metals,* v 3, Sept. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 808.

Wires of β-brass, Fe, Mo, Cb and Ta, were shown to be essentially a single fiber as predicted by theory. (Q24, Fe, Mo, Cb, Ta, Cu)

622-Q. The Hot-Tearing of Steel. J. M. Middleton and H. T. Protheroe. **Appendix: Statistical Analysis of Hot-Tear Tests.** M. Thomas and G. F. Komlosy. *Journal of the Iron and Steel Institute,* v. 168, Aug. 1951, p. 384-400.

Describes an apparatus for determining the loads a steel will withstand before tearing at high temperatures. The effect of casting temperature, and the influence of composition (for the usual range of concentrations of C, Si, Mn, S, Ni, Cr, Cu, P, Mo, Ti, and V), upon resistance to tearing, were investigated. Results of an investigation into the tear resisting properties of killed and semi-killed steels, as normally used for ingot production. The trends with respect to C, S, and Si are the same as when the steels are deoxidized according to accepted foundry practice. 15 ref. (Q26, D9, ST)

623-Q. Air Force's New "ML" Aluminum Casting Alloy. J. C. McGee. *Light Metal Age,* v. 9, Aug. 1951, p. 17-18, 20.

See abstract of "ML Aluminum Casting Alloy—A Material for Elevated Temperatures", *CADO Technical Data Digest.* See item 453-Q, 1951. (Q general, Al, SG-h)

624-Q. Molybdenum and Boron Steels. Norman Tisdale. *Metal Treating,* v. 2, July-Aug. 1951, p. 6-7, 23.

The use of boron in low-alloy steel to replace some of the Mo. Data comparing the mechanical properties of boron steel with other steels after heat treatment. (Q general, J26, AY)

625-Q. Structural Aluminum. Ernest Hartman. *Midwest Engineer,* v. 4, Sept. 1951, p. 7-9, 29, 30.

A comparison between Al alloy 14S-T6 and structural carbon steel. Data on compressive stresses and strains are graphed. Mechanical properties. (Q28, Q general, Al, CN)

626-Q. Wire Rope: How It's Made; How to Take Care of It. Charles M. Haas. *Mining Engineering,* v. 3, Sept. 1951, p. 772-775.

How wire rope is made, beginning with the individual wires. Different cross-sections are shown schematically. Wear and corrosion and methods for combatting them by lubrication and by Zn coating. (Q9, R general, L15, ST)

627-Q. Plastic Stress-Strain Relations for 75S-T6 Aluminum Alloy Subjected to Biaxial Tensile Stresses. Joseph Marin, B. H. Ulrich, and W. P. Hughes. *National Advisory Committee for Aeronautics,* Technical Note 2425. Aug. 1951, 48 pages.

Three types of tests were made: constant-stress-ratio tests, variable-stress-ratio tests, and special tests. The constant-stress-ratio test results gave control data and showed the influence of biaxial stresses on yield, fracture, and ultimate strength of the material. By means of the variable-stress-ratio tests, it is possible to determine whether there is any significant difference between the flow and deformation theory. The special tests were conducted to check specific assumptions made in the theories of plastic flow. (Q24, A1)

628-Q. Formation of Sulfide Films on Steel and Effect of Such Films on Static Friction. Erva C. Levine and Marshall B. Peterson. *National Advisory Committee for Aeronautics,* Technical Note 2460, Sept. 1951, 26 pages.

Experimental studies were conducted to evaluate the formation, under transient temperature conditions, of sulfide films on heated steel specimens immersed in solutions of free sulfur in cetane and to establish the necessary sulfide-film thickness for effective lubrication under static-friction conditions. Dry film thicknesses of 5000 Å. or greater were found necessary to prevent surface welding completely and to produce relatively low friction. Welding was appreciably reduced, however, with film thicknesses as low as 3400 Å. 15 ref. (Q9, ST)

629-Q. Dislocation Theory of the Fatigue of Metals. E. S. Machlin. "Thirty-Fifth Annual Report of the National Advisory Committee for Aeronautics, 1949" (published 1951), p. 183-192. (Technical report 929).

On the basis of this theory for annealed solid solutions; an equation giving dependence of the number of cycles for failure on stress, temperature, material parameters, and frequency is derived for uniformly stressed specimens. The equation is in quantitative agreement with the data. A predicted quantitative correlation between fatigue and creep was found to exist, which suggests the practical possibility of obtaining fatigue data for annealed solid solutions and elements from steady-state creep-rate data for these materials. 26 ref. (Q7, Q3)

630-Q. Test Piping and Materials. *Plant,* v. 4, Sept. 1951, p. 48-49.

Facilities of National Tube Co.'s new laboratory for physical and mechanical testing of tubular goods. (Q general, S13, ST)

631-Q. The Mechanical Properties of Metals. N. F. Mott. *Proceedings of the Physical Society,* v. 64, sec. B, Sept. 1, 1951, p. 729-741.

Extent to which plastic flow, work hardening, recovery, and creep can be explained in terms of the current theory of dislocations. 21 ref. (Q24, Q3)

632-Q. The Deformation and Ageing of Mild Steel. II. Characteristics of the Lüders Deformation. III. Discussion of Results. E. O. Hall. *Proceedings of the Physical Society,* v. 64, sec. B, Sept. 1, 1951, p. 742-753.

Part II: Experiments on the appearance of Lüders bands in thin strip and wire specimens. An attempt was made to elucidate some of the factors which influence their form. Part III: Explanation of phenomena observed in the yielding and aging of mild steel, in the general terms of a grain-boundary theory. 19 ref. (Q24, N7, CN)

633-Q. Magnesium Rare Earth Alloys. L. W. Eastwood. *Product Engineering,* v. 22, Sept. 1951, p. 158-161.

Properties and comparison with other cast alloys. (Q general, Mg)

634-Q. Torsional Fatigue Failures. J. O. Almen. *Product Engineering,* v. 22, Sept. 1951, p. 167-182.

Evaluates stresses and fracture characteristics developed by torsional loads in metal parts. Torsional stress diagram is developed for analysis of surface and subsurface stresses. Shows that the direct cause of fatigue failures from repeatedly applied torsional loads is always tensile stress; and the compressive stresses contribute only indirectly through altering the yield strength of the metal. (Q7, AY)

635-Q. Defining Hardness. P. Grodzinski. *Research,* v. 4, Sept. 1951, p. 431-432.

A serious objection to defining hardness as a stress, i.e., $H = P/A$ where H=hardness, P=load in kg. and A=area of indentation in sq. mm., as in current practice, is that it is dependent on load, especially in the microhardness range. A law of the form $h = pd^n$ is proposed, in which h(hardness) is load necessary to cause unit length of deformation, p is actual load, d is diameter of indentation, and n is a constant. A table gives some experimental results of tests carried out in the light of the new hardness concept and compared with conventional hardness results. 15 ref. (Q29, U)

636-Q. ISTC Division VIII Reports on Boron Steels. Harry B. Knowlton.

SAE Journal, v. 59, Sept. 1951, p. 51-58.

Second of a series. Heat treating grades of boron steels containing 0.30-0.65% carbon are used in the automotive industry for axles, shafts, steering knuckles, steering arms, springs and similar parts. Data on hardenability and mechanical properties. The report proper is supplemented by: data on 14B45, 80B50, and 80B60 from E. T. Bittner of American Steel Foundries; data on 86B45 from G. D. Reigel of Caterpillar; data on 81B46 and 94B30 from T. A. Frischman of Eaton Manufacturing; data on 81B40 from R. H. Lundquist of Minneapolis-Moline: and data on 50B47 from Frank Sailer and C. O. Parish, International Harvester. (Q general, J26, AY)

637-Q. Research Pushed on Gas Turbine Blade Materials. A. H. Allen. *Steel,* v. 129, Aug. 27, 1951, p. 72-75, 101.

Latest developments in research from industry, universities, and NACA. Cast and forged alloys, sintered-metal powders, and ceramals are being studied. Stress-rupture properties of 25 high-temperature alloys at 1200, 1350, 1500, and 1800° F. are tabulated. (Q4, T25, SG-h)

638-Q. Analogy Between the Rupture Failure of Methyl Methacrylate and That of Metals. (In French.) Felix Zandman. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, July 2, 1951, p. 20-21.

Methyl methacrylate samples were submitted to simple traction, bending, and cutting tests. Distribution of stress was observed by photoelastic methods, and fracture was studied micrographically. Results are compared with similar test on steel. (Q26, ST)

639-Q. Study of Internal Disorientation During the Plastic Deformation of a Metallic Monocrystal. (In French.) Jean Herenguel and Pierre Lelong. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, July 2, 1951, p. 53-55.

Studied for an Al-Mg alloy. (Q24, Al, Mg)

640-Q. Mechanical Properties of Basic Bessemer Steel With Low Nitrogen Content. (In French). L. Marbais and M. Nepper. *L'Ossature Métallique,* v. 16, June, 1951, p. 304-309.

Experiments show that utilization of oxygen can considerably improve the quality of basic bessemer steel. (Q general, D3, ST)

641-Q. Experimental Research on the Thermoelasticity of Metals. (In Italian.) Giorgio Bordoni. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, supplement, p. 1-21.

Data for such metals as Al, Fe, and various steels are extensively tabulated and charted. 144 ref. (Q21, Al, Fe, ST)

642-Q. On Temper Brittleness of Steels. (In English.) Vladimir Koselev. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, supplement, p. 22-26.

Temper brittleness is caused by changes in properties of alpha-iron space lattice. (Q23, ST)

643-Q. (Book) **Creep of Metals.** L. A. Rotherham. 80 pages. 1951. Institute of Physics, 47 Belgrade Square, London S.W. 1, England. 15 s.

The progressive plastic extension occurring in metals subjected continuously to stress at high temperatures, as in jet engines, is discussed from the physical point of view. Characteristics of the creep curve, crystalline flow, metallographic features of grain boundary, transient, steady-state, and tertiary creep are taken up, with a final chapter on the development of creep resistant alloys. 81 ref. (Q3, SG-h)

644-Q. (Book) **High-Temperature Properties of Metals.** 176 pages. 1951. American Soicety for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $4.00.

A series of five educational lectures presented during the 32nd National Metal Congress and Exposition, Chicago, Oct. 23-27, 1950. Covers creep, stress-rupture, high-temperature-fatigue, and oxidation testing, also some service experiences. Individual lectures are abstracted separately. (Q general, R2, SG-g, h)

645-Q. (Book) **Interpretation of Tests and Correlation With Service.** 198 pages. 1951. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

A series of four educational lectures presented during the 32nd National Metal Congress and Exposition, Chicago, Oct. 23-27, 1950. Refers exclusively to metals and alloys, their mechanical and corrosion testing, and service performance. Individual lectures are abstracted separately. (Q general, R11)

646-Q. (Pamphlet) **Low Temperature Properties of Ferrous Materials.** C. H. Lorig, chairman. 95 pages. Society of Automotive Engineers, 29 W. 39th St., New York 18, N. Y. (Special Publication 65, 1950.)

Effect of metallurgy, heat treatment, and design on low-temperature behavior of ferrous materials. Method for reducing stress concentration and selection of steels for low-temperature service. Test procedures and equipment for measuring low-temperature embrittlement. (Q general, Fe, ST)

647-Q. (Book) **The Mechanical Properties of Nickel Alloy Steels.** 1951. Mond Nickel Co., Ltd., Sunderland House, Curzon Street, London W. 1, England. (Gratis.)

A handbook confined to those heat treatable Ni alloy steels that are used in the case hardened or hardended and tempered condition. They are divided into two main groups: case hardening and direct hardening and in each case specifications are given for chemical composition, heat treatment and mechanical properties; representative tests which inclue the effect of mass; and tempering diagrams (direct-hardening steels only). (Q general, AY)

648-Q. (Book) **Strength of Materials.** Ed. 6. N. M. Belyaev. 772 pages. 1950. State Publishing House for Scientific and Technical Literature on Ferrous and Nonferrous Metallurgy. Moscow, U.S.S.R.

A standard text in Russian higher technical schools. Conventional treatment of the elastic, plastic, and clastic behavior of solids. This edition is a revision by various professors on the staffs of the Leningrad Institute of Railroad Transportation Engineers and the Leningrad Polytechnic Institute. The two concluding chapters touch on metallurgy for the first time. (Q23)

649-Q. (Pamphlet) **Symposium on Mechanical Properties of Metals at Low Temperatures.** 1951, 14 pages. National Bureau of Standards, Washington 25, D. C.

Long abstracts of nine papers presented at symposium held May 14-15, 1951. (Q general)

650-Q. Influences of Grain Flow on the Strength of Lugs. G. I. Robinson. *Aircraft Engineering,* v. 23, Sept. 1951, p. 257-260.

Discusses an article by D. L. McElhinney, published in the Mar. 1951, issue on "The Effect of Light Alloy Extrusions" (see item 189-Q, 1951) which reviewed the results of a series of tests on longitudinal and transverse-grain lugs machined from extruded bar. Recommendations as to the design of lugs manufactured from extruded bar were extended to lugs manufactured from forged material. It is felt that these recommendations—at least in so far as forged lugs are concerned—do not cover all contingencies. A tentative hypothesis is proposed, to account for failures encountered.
(Q24, Q25, A1)

651-Q. Properties of Steel as Influenced by Constitution. A. G. Forrest, and R. W. Farley. *American Institute of Mining and Metallurgical Engineers,* "Basic Open Hearth Steelmaking," Ed. 2, 1951, p. 490-527.

Relations between steel constitution and properties, such as chemical composition, its uniformity and relation to the properties austenitic grain size, hardenability, and machinability. 30 ref.
(Q general, G17, J26, M24, ST)

652-Q. Nickel, Aluminum, Molybdenum Alloys for Service at Elevated Temperatures. H. V. Kinsey and M. T. Stewart. *Industrial Heating,* v. 18, Sept. 1951, p. 1586, 1588, 1590. (A condensation.)

Development and testing of nickel-rich, Ni-Al-Mo alloys for high-temperature applications such as gas-turbine blades.
(Q general, T25, Ni, SG-h)

653-Q. Determining Physical Properties and Testing Finished Products. Howard C. Roberts. "The Handbook of Measurement and Control." *Instruments Publishing Co.* (Pittsburgh), 1951, p. 197-202.

Tabular arrangement of testing methods. Tables are representative of the most widely used methods for determining the properties found most useful in science and in industry. (Q general, P general)

654-Q. Hot Hardness of Plated Finishes Measured. *Iron Age,* v. 168, Sept. 20, 1951, p. 119. (Based on work by Abner Brenner of National Bureau of Standards.)

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 89-Q, 1951. (Q29)

655-Q. Embrittlement of Tempered Martensite Better Defined. P. Payson. *Iron Age,* v. 168, Sept. 27, 1951, p. 86-89.

There is a minimum in the notch-impact vs. tempering-temperature curve of hardened steel at about 600° F. temper. This phenomenon unfortunately has sometimes been referred to as "temper embrittlement," and sometimes even as "blue brittleness." An attempt is made to point out the distinct differences between them. Data on impact properties of various steels are graphed and tabulated. (Q23, Q6, ST)

656-Q. Production Problems. VIII. Fractured Wire Rope. *Iron and Steel,* v. 24, Sept. 1951, p. 421-422.

An investigation on the primary causes of failure in wire rope.
(Q26, S13, ST)

657-Q. Some Experimental Indications of the Stresses Produced in a Body by an Exploding Charge. John S. Rinehart. *Journal of Applied Physics,* v. 22, Sept. 1951, p. 1178-1181.

Effects produced by small cylindrical charges detonated on the surfaces of heavy steel plates. Particu-

lar attention is paid to shapes of crater, changes in hardness, flow patterns, fractures, and changes in microstructure. The distribution of stress appears in some respects to correspond to that which might be set up by a static load.
(Q25, M27, ST)

658-Q. Some Observations on the Occurrence of Stretcher-Strain Markings in an Aluminium-Magnesium Alloy. R. Chadwick and W. H. L. Hooper. *Journal of the Institute of Metals,* v. 19, Sept. 1951, p. 17-22.

Detailed observations of the appearance and dimensional distortion associated with surface markings developed by the progressive stretching of Al + 3% Mg alloy sheet in different conditions of cold working and annealing. (Q24, Al)

659-Q. Creep and Stress Rupture as Rate Processes. Italo S. Servi and N. J. Grant. *Journal of the Institute of Metals,* v. 19, Sept. 1951, p. 33-37.

Creep data for an Fe-Co-Cr-Ni alloy reported by Grant and Bucklin are analyzed according to the rate-process theory of plastic flow. The data indicate that the theory can be applied over only a limited range of creep rates. An empirical equation, which relates applied stress and the temperature to minimum creep rate, is suggested for analysis of creep data. This equation is valid only in the absence of structural instabilities. 12 ref. (Q3, Q4)

660-Q. How to Determine Toughness of Steels from Notched Bar Tests. E. J. Ripling. *Materials & Methods,* v. 34, Sept. 1951, p. 81-85.

Charts show notched properties as a function of tensile strength, which can be used to indicate safe and unsafe strength levels, and which make it possible to compare the toughness properties of steels at the same hardness. (Q23, ST)

661-Q. High Temperature Properties of Stainless Steel Tubing. *Materials & Methods,* v. 34, Sept. 1951, p. 113.

Tabular data on mechanical and physical properties of seven types. Includes temperature of inception of embrittling grain growth, resistance to intergranular carbide precipitation, and safe temperatures for use in oxidizing atmospheres.
(Q general, P general, R2, SS, SG-h)

662-Q. Mechanical Properties of α-Solid Solutions of Copper With Zinc, Gallium, Germanium and Arsenic. N. P. Allen, T. H. Schofield and A. E. L. Tate. *Nature,* v. 168, Sept. 1, 1951, p. 378-379.

Tensile properties of Cu-Zn, Cu-Ga, Cu-Ge, and Cu-As solid-solution alloys in wire form were examined. Results indicate that when these alloys are produced by identical methods in the form of soft annealed wires of approximately equal grain size, the ultimate tensile strength and resistance to plastic deformation appear to be almost entirely governed by electron-atom ratio.
(Q23, Cu, Zn, Ge, Ga, As)

663-Q. NBS Micro Hot-Hardness Tester. Abner Brenner. *Technical News Bulletin* (National Bureau of Standards), v. 35, Sept. 1951, p. 134-136.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 89-Q, 1951.
(Q29)

664-Q. Light Alloys for Modern Aircraft; Constant Search for Improved Materials. *Times Review of Industry,* v. 5, Sept. 1951, p. 46, 49.

Work being done in the research foundry of a British firm. Methods of studying mechanical properties and constitution of light alloys.
(Q general, T24, Al, Mg)

665-Q. Upper and Lower Transitions in Charpy Test. W. J. Harris, Jr., J. A. Rinebolt and R. Raring. *Welding Journal,* v. 30, Sept. 1951, p. 417s-422s.

Charpy V-notch specimens of medium-carbon steels were tested in impact by multiple low-velocity, low-energy blows. Under these conditions, a discontinuity in the energy-temperature discontinuity was associated with the occurrence of plastic-strain markings on the sides and top of the specimens. (Q6, CN)

666-Q. Residual Stresses in Welded Mild-Steel Pipe. L. J. Privoznik. *Welding Journal,* v. 30, Sept. 1951, p. 422s-428s.

Stresses due to circumferential single-V butt welds, made with five passes in 5½-in. O.D., ½-in. wall thickness, mild steel pipe, were determined by the Sachs boring-out method. Effects of various welding procedures upon magnitude of stresses, both in the weld and in the parent metal 1¼ in. from the weld, were investigated. Effects of various welding, thermal-stress-relief, and annealing procedures were determined. (Q25, K general, K9, CN)

667-Q. Stresses in Large Horizontal Cylindrical Pressure Vessel on Two Saddle Supports. L. P. Zick. *Welding Journal,* v. 30, Sept. 1951, p. 435s-445s.

Indicates the approximate stresses in cylindrical vessels supported on two saddles at various locations. Knowing these stresses, it is possible to determine which vessels may be designed for internal pres-

sure alone, and to design structurally adequate and economical stiffening for the vessels which require it. Formulas are developed to cover various conditions. A chart covers support designs for pressure vessels made of mild steel for storage of liquid weighing 42 lb. per cu. ft. (Q25, CN)

668-Q. The Effect of Fabrication Processes on Steels Used in Pressure Vessels. S. S. Tör, J. M. Ruzek, and R. D. Stout. *Welding Journal,* v. 30, Sept. 1951, p. 446s-450s.

Notch toughness of steel plate which had been prepared by machining, by flame cutting, or by shearing, was investigated. (Q23, G17, G22, ST)

669-Q. The Micro-Mechanism of Fracture in the Tension Impact Test; Supplementary Report No. I. Walter H. Bruckner. *Welding Journal,* v. 30, Sept. 1951, p. 459s-469s.

Tension-impact tests of rimmed and killed structural steels in which a spheroidizing heat treatment has eliminated lamellar carbide structure. Numerous graphs and micrographs. (Q27, CN)

670-Q. Sigma Phase in Several Cast Austenitic Steels. V. T. Malcolm and S. Low. *American Society for Testing Materials,* "Symposium on the Nature, Occurrence, and Effects of Sigma Phase," 1951, p. 38-44; disc., p. 45-47.

Previously abstracted from *American Society for Testing Materials,* Preprint 51, 1950. See item 478-Q, 1950. (Q6, M26, SS)

671-Q. Some Notes on the Structure and Impact Resistance of Columbium-Bearing 18-8 Steels After Exposure to Elevated Temperatures. W. O. Binder. *American Society for Testing Materials,* "Symposium on the Nature, Occurrence, and Effects of Sigma Phase," 1951, p. 146-164; disc., p. 164.

Previously abstracted from *American Society for Testing Materials,* Preprint 44, 1950. See item 477-Q, 1950. (Q6, M26, SS)

672-Q. Observations of the Effect of Sigma on the Mechanical Properties of Columbium-Stabilized Weldments in Austenitic Stainless Steels. F. W. Schmitz and M. A. Scheil. *American Society for Testing Materials,* "Symposium on the Nature, Occurrence, and Effects of Sigma Phase," 1951, p. 165-177; disc., p. 178-181.

Summary of the investigation of 13 weldments in 1½-in. thick T347 stainless steel on the basis of heat treatments given for stress removal. (Q25, general, M27, SS)

673-Q. Some Recent Observations in Micro-Hardness Testing. E. Börje Bergsman. *ASTM Bulletin,* Sept. 1951, p. 37-43. (Translated from the Swedish.)

Examines some of the factors responsible for lack of agreement of results in microhardness testing. Influence of indentation speed, length of the contact period, shocks, vibrations, and specimen preparation. Load dependence of hardness number was observed for hardened steel, soft annealed 18-8 stainless steel, and soft iron. 24 ref. (Q29, ST, SS, Fe)

674-Q. Rupture of Oxide Films During Repeated Sliding. A. J. W. Moore and W. J. McG. Tegart. *Australian Journal of Scientific Research,* ser. A., v. 4, June, 1951, p. 181-184.

When Cu specimens are subjected to repeated sliding, nonmetallic particles are included in the surface layers as a result of severe plastic working produced by repeated sliding. Relations between various factors involved. Relation to layers formed by polishing is considered. 10 ref. (Q24, Cu)

675-Q. The Scattered Light Method of Exploration of Stresses in Two- and Three-Dimensional Models. H. T. Jessop. *British Journal of Applied Physics,* v. 2, Sept. 1951, p. 249-260.

Investigation shows that the method is practicable and presents no more difficulty than any other method. It possesses considerable advantages in certain cases. By eliminating errors due to averaging the observations over an area of the model, the method removes one of the main obstacles to accurate determination of stresses in three dimensions. (Q25)

676-Q. Photoelastic Determination of Free Boundary Stresses on "Frozen Stress" Models by an Oblique Incidence Method. V. M. Hickson. *British Journal of Applied Physics,* v. 2, Sept. 1951, p. 261-269.

The methods of determining the stress at the boundary of a three-dimensional photo-elastic model are reviewed and the oblique incidence method is investigated in some detail. Tests were carried out on a grooved cylinder in which a comparison was made between oblique incidence determinations of the boundary stresses and determinations from slices cut in the directions of the boundary principal stresses. (Q25)

677-Q. The Influence of Surface Roughness Upon the Impact Strength of Steels at Low Temperatures. G. I. Pogodin-Alexeyeff and A. V. Pamfiloff.

Engineers' Digest, v. 12, Sept. 1951, p. 298-299. (Translated and condensed from *Stanki i Instrument* (Machine Tools and Equipment, no. 4, 1951, p. 22-23.)

Investigations into the influence of surface roughness on impact strength at room and subzero temperatures. Data on hard and soft steels are tabulated. (Q6, ST)

678-Q. Uses Broaden for Ductile Iron. *Inco,* v. 25, Autumn edition, 1951, p. 14-15.

Mechanical properties of ductile iron compared with those of iron and steel castings. Applications. (Q general, T general, CI)

679-Q. Metal Transfer From Piston Rings to Cylinders During "Run-In". C. D. Strang and J. T. Burwell. *Institution of Mechanical Engineers, Proceedings (Automobile Div.),* pt. 4, 1949-50, p. 169-172; disc., p. 173-175.

Piston rings with radioactive Cr wearing-surfaces were used to study the micro-welding between rings and cylinder wall during "run-in" in a small, water-cooled, internal combustion engine. The results indicated that micro-welding and the accompanying transfer of metal were present under the mildest conditions of engine operation. The distribution of micro-welding along the ring-travel was found to correspond to the wear profile observed in engine cylinders by other workers. Pistons were Al alloy; rings were Cr-plated steel or cast iron; and cylinders were SAE-4140 steel or cast iron. (Q9, Al, AY, CI, Cr)

680-Q. Physical and Mechanical Properties of Segregates in Two Alloy Steels. H. M. Finniston and T. D. Fearnehough. *Journal of the Iron and Steel Institute,* v. 169, Sept. 1951, p. 5-12.

Techniques for the measurement. The quantitative differences in properties between the segregates and the matrices surrounding them after various heat treatments; the former are shown to be significantly harder, and to have a higher proof and maximum stress and lower elongation and impact values on all casts. Differences in chemical composition between segregate and matrix. Photomicrographs show structures of segregate and matrix. 10 ref. (Q general, M27, AY)

681-Q. Low-Temperature Fractures in Tempered Alloy Steels. A. R. Entwisle. *Journal of the Iron and Steel Institute,* v. 169, Sept. 1951, p. 36-38.

A study was made of fractures of plain carbon and low-alloy steels at low temperatures, the latter steels being in various states of temper embrittlement. Micrographs of fractures are given. (Q26, AY)

682-Q. Creep and Stress Rupture Behavior of Aluminum As a Function of Purity. Italo S. Servi and Nicholas J. Grant. *Journal of Metals,* v. 3, Oct. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 909-916.

Data of minimum creep rates and rupture times for high-purity and commercial aluminum confirm the existence of a transition range from the low-temperature type to high-temperature type behavior. The data are analyzed in line with the suggested theories of deformation of metals. 14 ref. (Q3, Q4, Al)

683-Q. Structure Observations of Aluminum Deformed in Creep at Elevated Temperatures. Italo S. Servi and Nicholas J. Grant. *Journal of Metals,* v. 3, Oct. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 917-922.

Metallographic observations. The creep and stress-rupture tests were conducted in simple tension at constant stress. Details on experimental technique. (Q3, Q4, M27, Al)

684-Q. Plasticity of Molybdenum Single Crystals. N. K. Chen and R. Maddin. *Journal of Metals,* v. 3, Oct. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 937-944.

In the extension of Mo single crystals at room temperature, the slip planes were investigated. Theories of plasticity of body-centered cubic metals were examined, and an explanation based upon planes of highest atomic density seems plausible to explain the plastic behavior of Mo single crystals. (Q24, Mo)

685-Q. Radioactive Tracers Reveal Friction and Wear of Metals. J. T. Burwell and C. O. Strang. *Metal Progress,* v. 60, Sept. 1951, p. 69-74.

Techniques developed at MIT. Fundamental principles involved. Typical results are tabulated, charted, and illustrated. (Q9, S19)

686-Q. Hardness Scale Selector for Steel. E. F. Bradley. *Metal Progress,* v. 60, Sept. 1951, p. 80, 80B.

Developed by Pratt & Whitney, to provide some means of selecting suitable hardness scales. It applies only to parts of nominally uniform metallographic structure (not carburized or decarburized) and of nominally uniform hardness throughout. (Q29, ST)

687-Q. Strength of Pure Molybdenum at 1800 to 2400° F. Roger A. Long, K. C. Dike, and H. R. Bear. *Metal Progress,* v. 60, Sept. 1951, p. 81-88.

See abstract of "Some Properties

of High-Purity Sintered Wrought Molybdenum Metal at Temperatures Up to 2400° F.," *National Advisory Committee for Aeronautics*, Technical Note 2319, Mar. 1951. See item 248-Q, 1951.
(Q general, M general, Mo)

688-Q. Low Temperature Properties of Iron and Steel. *Metal Progress*, v. 60, Sept. 1951, p. 98, 100, 102, 104, 106, 108, 110, 112, 114, 116. (Condensed from "Low Temperature Properties of Ferrous Materials," S. A. E. Iron and Steel Technical Committee, *Society of Automotive Engineers.)*

Previously abstracted from original. See item 585-Q, 1950.
(Q general, ST)

689-Q. High-Tensile Structural Steel. *Metal Progress*, v. 60, Sept. 1951, p. 122, 124. (Condensed from "Structural High-Tensile (Low-Alloy) Steel," O. A. Kerensky.)

Previously abstracted from *Engineer*. See item 3B-57, 1949.
(Q general, T26, CN)

690-Q. Homogeneous Extension of Single Crystals. F. D. Rosi. *Review of Scientific Instruments*, v. 22, Sept. 1951, p. 708-710.

Use of a gimbal and grip arrangement in testing. A greater range of homogeneous deformation is possible. (Q24)

691-Q. The Problem of Wear. (In German.) W. Späth. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 17, July 1951, p. 214-219.

Correlation of hardness, fatigue resistance, and microstructure with wear resistance. Graphs show experimentally established test results. 20 ref. (Q9)

692-Q. Aluminum Pipe. *Heating Piping & Air Conditioning*, v. 23, Oct. 1951, p. 119-121.

Data on bursting pressures at room and elevated temperatures, mechanical and physical properties, also dimensional and head loss data. (Q general, P general, Al)

693-Q. Chrome Plating Affects Plastic Deformation of Steel. *Iron Age*, v. 168, Oct. 18, 1951, p. 101.

Tests at National Bureau of Standards on SAE 4130 steel.
(Q24, L17, Cr, AY)

694-Q. Heavy Coiled Springs; Fatigue Properties of Silicon-Manganese Steel Tank Components. (Concluded) W. E. Bardgett and F. Gartside. *Iron and Steel*, v. 24, Sept. 1951, p. 411-416; Oct. 1951, p. 454-458.

Results of a series of tests designed to investigate the effect of difference in method of preparation, of shot peening and of interval stress. Factors which influence endurance behavior such as structure, hardness, degree of decarburization, internal stress of scragging, and relief of stress in testing. (Q7, AY)

695-Q. Testing Machine Aids Research. *Machine Design*, v. 23, Oct. 1951, p. 116.

Use and operation of 3,000,000-lb. universal testing machine by Aluminum Co. of America for determining optimum conditions for extruding, forming and forging Al and Mg and their alloys.
(Q general, F general, G general, Al general, Mg)

696-Q. Choosing the Right Low-Temperature Metals. John R. Watt. *Machine Design*, v. 23, Oct. 1951, p. 117-121.

See abstract under similar title from *Refrigerating Engineering;* item 563-Q, 1951. (Q general, Fe, Ni)

697-Q. Leaded Versus Lead-Free Gunmetals. E. C. Mantle. *Metal Industry*, v. 79, Sept. 28, 1951, p. 255-256.

Properties of 85-5-5-5 leaded gunmetal are compared with those of the other alloys used for bronze castings, such as Admiralty gunmetal. It is shown that there is a good case for adopting the former for most work involving pressure tightness and tensile strength. Comparative properties are tabulated.
(Q23, E25, Cu)

698-Q. Surface Conditions and the Creep of Extruded High-Purity Lead. R. C. Gifkins. *Metallurgia*, v. 44, Sept. 1951, p. 122.

An investigation made into the effect of the presence of the extrusion layer on the creep of Pb.
(Q3, Pb)

699-Q. Fatigue Resistance of Heat Treated Aluminum and Beryllium Bronzes. *Metal Progress*, v. 60, Oct. 1951, p. 190, 192, 194. (Condensed from "The Resistance of Aluminum and Beryllium Bronzes to Fatigue and Corrosion Fatigue," D. G. Sopwith, *Aeronautical Research Council*, Reports and Memoranda 2486.)

Results of experiments.
(Q7, R1, Cu)

700-Q. Centrifugal Method of Testing at High Temperatures. *Metal Progress*, v. 60, Oct. 1951, p. 194, 198, 202, 204-206. (Translated and condensed from "Centrifugal Method of Testing the Strength of Metals and Alloys at High Temperatures," I. I. Kornilov, and from "The Centrifugal Method of Testing Metals and Alloys at High Temperatures," M. E. Rabinovich.)

Previously abstracted from *Zavodskaya Laboratoriya* (Factory Laboratory). See items 9-124 and 9-316, 1949. (Q23)

701-Q. Development of Research in High-Temperature Rheology of Metals. Paul Feltham. *Metal Treatment and Drop Forging,* v. 18, Sept. 1951, p. 389-394.

Past, current, and possible future work in the high-temperature rheology of metals. Shows that a study of research in its historical, social, and economic setting can materially contribute to its advance. 23 ref. (To be continued). (Q24)

702-Q. Investigation of Influence of Chemical Composition on Forged Modified Low-Carbon N-155 Alloys in Solution Treated and Aged Condition as Related to Rupture Properties at 1200° F. E. E. Reynolds, J. W. Freeman and A. E. White. *National Advisory Committee for Aeronautics,* Technical Note 2449, Sept. 1951, 111 pages.

Modifications investigated included individual variations of each of the ten elements present in low-carbon N-155 and simultaneous variations of Mo, W, and Cb. Indicates that melting and hot working conditions play an important role in high-temperature properties of alloys of the type investigated. (Q4, SG-h)

703-Q. Friction of Clean Metals and the Influence of Adsorbed Films. F. P. Bowden and J. E. Young. *Proceedings of the Royal Society,* ser. A, v. 208, Sept. 7, 1951, p. 311-325.

Details of an experimental study of the frictional behavior of thoroughly degassed metal surfaces. Using an apparatus in which friction can be measured at any desired temperature up to 1200° C. or more, either in vacuo or in a particular gas, it was found that when sufficiently clean metals are allowed to touch, even at room temperature, complete seizure occurs. Over the real area of contact, the specimens adhere with the bulk strength of the metal, and this area increases greatly with continued sliding or attempted sliding. Various gases and vapors were adsorbed onto the clean specimens, and their influences on friction determined. Results support the view that friction of metals is due mainly to adhesion at the points of real contact, and is governed by the extent to which even the thinnest of surface films can reduce this contact. 16 ref. (Q9)

704-Q. Effect of Low Temperatures on Aircraft Metals. J. B. Johnson and D. A. Shinn. *Product Engineering,* v. 22, Oct. 1951, p. 187-192.

Effect on mechanical properties. (Q general)

705-Q. Torsion Spring Charts for Round or Square Wire. H. F. Ross. *Product Engineering,* v. 22, Oct. 1951, p. 203, 205.

Three charts are included for the rapid calculation of helical types of torsional springs which are loaded in a direction tending to reduce the diameter of the coil. These data hold for average conditions where either static or relatively slow varying loads are applied. (Q1, T7)

706-Q. Sheet Metal Bend Allowance and Correction Charts. *Product Engineering,* v. 22, Oct. 1951, p. 207. (Q5, Al, Mg, ST)

707-Q. NBS Micro Hot-Hardness Tester. *Products Finishing,* v. 16, Oct. 1951, p. 60, 62, 64. (Condensed from "Microhardness Tester for Metals at Elevated Temperatures," Abner Brenner.)

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 89-Q, 1951. (Q29)

708-Q. The Design and Fabrication of Welded Structures Subjected to Repeated Loading. Part VII. R. Weck. *Welder,* v. 20, Jan.-June, 1951, p. 12-22.

Results on the fatigue strength of ordinary unmachined fillet welded joints. Data on design and fatigue strength are tabulated. (To be continued). (Q7, K9, ST)

709-Q. Performance of High-Strength Aluminum Alloy Weldments. W. R. Apblett and W. S. Pellini. *Welding Journal,* v. 30, Oct. 1951, p. 473s-481s.

The effect of major variables allied to stress conditions on the performance of weldments. Tensile-strength data are summarized in tabular form. (Q27, K9, Al)

710-Q. The Effect of Microstructure on Notch Toughness. Part I. J. H. Gross and R. D. Stout. *Welding Journal,* v. 30, Oct. 1951, p. 481s-485s.

Effect of pearlite spacing on the notch toughness of a plain high-carbon steel with different grain sizes. (Q23, M27, CN)

711-Q. Fatigue Strength of Spot-Welded Light Alloy Joints. Hiroshi Kihara. *Welding Journal,* v. 30, Oct. 1951, p. 529s-536s.

Effects of variations in load, plate overlap, pitch of spots, distance between rows, and span on fatigue strength. (Q7, K3, Al)

712-Q. The Creep of Metals. Definitions, Nomenclatures, and Research Methods. (In Dutch.) *Metalen,* v. 6, July 28, 1951, p. 263-268.

Standards and research practices in various countries. (Q3)

713-Q. Copper and Copper Alloys. 4. Bronzes Alloyed With Nickel. (In Dutch.) W. G. R. De Jager. *Metalen,* v. 6, July 15, 1951, p. 255-256; Aug. 15, 1951, p. 292-293.

Composition; and mechanical properties of bearing bronzes are summarized in tabular form. Pressure-cast bronze is discussed and compositions and properties of 14 different alloys are tabulated. Graphs show the effect of Ni content on grain size. (Q general, Cu)

714-Q. Quality Testing of Swedish Cast Iron. (In Swedish.) Bertil Tyberg. *Gjuteriet,* v. 40, July, 1950, p. 97-127; disc., 127-128.

Seventeen Swedish gray-iron foundries of different size and type of production have cast 1680 30-mm. diam. test bars which have been tested by a central organization. The tests performed include chemical analysis, tensile strength, wedge-cutting strength, and Brinell hardness. The results obtained show good agreement with those of recent British and American investigations. (Q general, CI)

715-Q. (Book) **Theory of Elasticity.** S. Timoshenko and J. N. Goodier. 506 pages. 1951. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, 18, N. Y.

A revision and modernization of the first edition. The treatments of the photo-elastic method, two-dimensional problems in curvilinear coordinates, and thermal stress were rewritten and enlarged into separate new chapters which present many methods and solutions not given in the former edition. An appendix on the method of finite differences and its applications, including the relaxation method, was added. New articles and paragraphs are incorporated. Chapter problems. (Q21, Q25)

716-Q. The Strength Characteristics of Helical Springs. R. C. A. Thurston. *Canadian Mining and Metallurgical Bulletin,* v. 44, Oct. 1951, p. 658-667; disc., p. 667-668. *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 414-423; disc., p. 423-424.

Numerous considerations affecting the design of helical compression springs. Brief mention of modern methods of spring manufacture, particularly as regards their effect on strength characteristics. A critical analysis of stresses in such springs, and results of laboratory tests under static loading on a series of truck bolster springs. Effects of the various methods developed for increasing life or endurance of compression springs, such as shot-peening and scragging. 14 ref. (Q23, G23, T7, ST)

717-Q. Three-Faceted Diamond Pyramid for Micro-Hardness Testing. E. S. Berkovich. *Industrial Diamond Review,* v. 11, June 1951, p. 129-132. (Translated from *Zavodskaya Laboratoriya* (Factory Laboratory), v. 16, no. 3, 1950, p. 345-347.)

Additional information concerning Russian work. Test data obtained on various metallic and nonmetallic materials are tabulated and charted. (Q29)

718-Q. Allowable Compressive Stresses in Aircraft Structures. B. E. Gatewood and E. L. Williams. *Journal of the Aeronautical Sciences,* v. 18, Oct. 1951, p. 657-664.

Procedures for determining allowable buckling and maximum compressive stresses in both the elastic and plastic regions for structural materials for which compressive stress-strain curves are known. Curves are shown for Al and Mg alloys. Detailed procedures for obtaining allowable compressive stresses in both the elastic and plastic regions for various types of aircraft structure under compressive loads. 51 ref. (Q28, Al, Mg)

719-Q. The Role of Tetragonal Twins in the Internal Friction of Copper Manganese Alloys. Arthur V. Siefert and Francis T. Worrell. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1257-1259.

Internal-friction studies were made of an 88% Mn, 12% Cu alloy. This alloy when annealed at 925° C. and quenched to room temperature has a tetragonal structure of axial ratio 0.97. Twins are readily formed along the (101) and (011) planes. It is verified that relaxation across these twin boundaries would account for certain observed internal friction. (Q22, M26, Mn)

720-Q. The Yielding Behavior of Iron Single Crystals. A. N. Holden. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1290-1291.

In three recent experiments small amounts of carbon or nitrogen were deliberately added to otherwise pure single crystals of iron, and effect on yielding studied. In one experiment no initial yield point was observed while, in the others, initial yield points of small magnitude were observed. Hence, further experimental work was done. Results are summarized and explained theoretically. (Q23, Fe)

721-Q. Fracture and Yield Stress of 1020 Steel at Low Temperatures. A. S. Eldin and S. C. Collins. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1296-1297.

Several samples were tested at various temperatures in the inter-

val 12-61.5° K. All exhibited typically brittle fracture with no reduction in area. At 75° K., however, a definite yield point was observed and increase in length before rupture was unexpectedly large. Results indicated a sharp transition near 61.5° K., below which no reduction of area occurs and above which the reduction of area increases rapidly with temperature. (Q27, CN)

722-Q. Inhomogeneities in the Plastic Deformation of Metal Crystals. I. Occurrence of X-Ray Asterisms. II. X-Ray and Optical Micrography of Aluminium. R. W. K. Honeycombe. *Journal of the Institute of Metals,* v. 80, Oct. 1951, p. 45-56.

Occurrence of X-ray asterisms from deformed single crystals of a typical hexagonal metal (Cd) and a typical cubic metal (Al). The experiments suggest that tensile deformation causes Al, but not Cd, crystals to break down into a series of slightly disoriented blocks connected by regions of distortion or lattice curvature. Part II: technique of X-ray microscopy used in conjunction with optical micrography to investigate structure of large Al crystals deformed by small amounts in tension. Effects of crystal orientation, temperature and speed of deformation, and purity of metal on occurrence of kink bands. 37 ref. (Q24, M21, Al, Cd)

723-Q. Micro-Slip in Metal Crystals. A. F. Brown and R. W. K. Honeycombe. *Philosophical Magazine,* ser. 7, v. 42, Oct. 1951, p. 1146-1149.

Al crystals, the surfaces of which were prepared for examination by electropolishing, show extremely fine slip bands (displacements of 150 A. or less) after small plastic deformations of about 0.5-2%. The more familiar coarse bands involving displacements of the order of 5000 A. appear subsequently. However, if the metal surface is mechanically polished prior to electrolytic polishing, the coarse bands occur in the earliest stages of deformation. Two possibilities are: first, that the micro-slip is a phenomenon restricted to the vicinity of the surface and is highly dependent on the nature of it; second, that the fine slip may be typical of initial slip processes within the metal, but is almost entirely suppressed as the deformation proceeds. (Q24, L13, Al)

724-Q. Metallic Transfer Between Sliding Metals: An Autoradiographic Study. E. Rabinowicz and D. Tabor. *Proceedings of the Royal Society,* ser. A, v. 208, Sept. 24, 1951, p. 455-475.

A study of friction and metallic transfer between sliding metal surfaces in the absence and in the presence of boundary lubricant films. Six metal pairs were studied. One surface is made radioactive and is slid over the surface of a second, non-radioactive metal, the amount of metal transferred being detected by blackening of a photographic plate in contact with the second surface. The results indicate that friction between metals is due largely to formation and shearing of metallic junctions, and that the main function of a boundary lubricant is to reduce the amount of metallic interaction. 32 ref. (Q9)

725-Q. Tests for SAE Grade 5 Bolts. *SAE Journal,* v. 59, Oct. 1951, p. 57-61.

Data on Rockwell hardness, tensile strength, yield strength, and elongation are graphed and tabulated. The bolts contained 0.42% C, 0.82% Mn, and 2.25% Si. (Q27, Q29, T7, ST)

726-Q. Internal Friction of Solids. R. M. Davies. "Some Recent Developments in Rheology", United Trade Press (London), 1950, p. 27-37.

Internal friction in vibrating solids. Methods of measurement. Causes and mechanism of the phenomenon. 32 ref. (Q22)

727-Q. Application of the Pendulum to the Measuring of Surface Hardness. "Pendulum Hardness"—Microhardness of Chromium Deposits. (In French.) Le Rolland "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 7-15.

Experiments with a relatively new hardness measuring apparatus. The results agree with those obtained by other methods. Various devices and their mode of operation. (Q29, L17, Cr)

728-Q. Contribution to the Study of Hardness of Hard Chromium Deposits, Produced in Industry and in the Laboratory. (In French.) A. Mittenne. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 32-46.

Influence of the hardness of the base metal on hardness measurements on Cr deposits. Methods and results. (Q29, L17, Cr, ST)

729-Q. Mechanism of Fracture of Pearlite. (In Czech.) Vladimir Zednik and Zdenek Kaderavek. *Hutnické Listy,* v. 6, May 1951, p. 211-220.

Fracture mechanism in pearlite subjected to shock strains was studied fractographically on notched samples of eutectoid carbon steel in the range −195 +150° C. In the first stage of the fracture, cracks appear selectively on the boundaries of ferrite and cementite plates in a number of grains with a favorable orientation of lamellar to nor-

mal stress. It appears, therefore, that for inception of fracture, cohesion of pearlite components is the deciding factor. In the second stage of fracture, interlamellar fusion of microcracks and concentration of stress resulting in translamellar fracture in neighboring grains occurs. Includes numerous fractographs. (Q26, ST)

730-Q. Thermodynamics of Plastic Deformation. (In Russian.) N. S. Fastov. *Doklady Akademii Nauk SSSR,* (Reports of the Academy of Sciences of the USSR), new ser., v. 78, May 11, 1951, p. 251-254.

Derives an expression for free energy of a body undergoing plastic deformation with given end velocity. Expressions are developed for the relation between yield point, maximum elastic deformation, and rate of deformation; and between stress and deformation and its rate during plastic deformation, and the shape of the creep curve; all agreeing qualitatively with experimental data. (Q24, P12)

731-Q. Fatigue of Metals. (In Russian.) N. S. Akulov, I. P. Mazin, and Ya. I. Feldshtein. *Doklady Akademii Nauk SSSR,* (Reports of the Academy of Sciences of the USSR), new ser., v. 78, May 11, 1951, p. 263-266.

On the basis of a simple physical model of the formation of primary fatigue cracks, a relation was established between amplitude of vibrating stress and number of cycles. This relation is in good agreement with experimental data of various authors. (Q9)

732-Q. Impact Properties of Stainless Steel and 9 Per Cent Nickel Steel After Exposure Under Stress to Liquid Nitrogen. T. N. Armstrong and A. J. Miller. *ASTM Bulletin,* Oct. 1951, p. 35-36.

Data are tabulated. (Q6, SS)

733-Q. Reproducibility of Bend Test for High Hardness Steels. L. D. Jaffe and D. C. Buffum. *ASTM Bulletin,* Oct. 1951, p. 36-37.

High-carbon, alloy-steel specimens were given a single heat treatment that produced a Rockwell hardness of C-52½. The strength of these specimens was determined by bending under two-point loading until rupture occurred. (Q5, AY)

734-Q. Effect of Amplitude of Dynamic Stress on High Temperature Fatigue Life. John E. Breen. *ASTM Bulletin,* Oct. 1951, p. 38-39.

A study of the effect of dynamic amplitude on α-brass (70% Cu, 30% Zn) at high temperatures. In these tests, dynamic stress was varied from zero to as close to 100% as practicable, while static stress was held constant. (Q7, Cu)

735-Q. Apparatus for Low-Temperature Tension Tests of Metals. Robert J. Mosborg. *ASTM Bulletin,* Oct. 1951, p. 41-44.

Apparatus developed in the Structural Research Laboratory of the Civil Engineering Dept. at the University of Illinois. In the range between room temperature and the temperature obtainable with solid CO_2, no special difficulties were encountered, and relatively simple apparatus and procedures can be used. (Q27)

736-Q. Hot-Workability of Stainless Steel Improved by Adding Cerium and Lanthanum. C. B. Post, D. G. Schoffstall, and H. O. Beaver. *Journal of Metals,* v. 3, Nov. 1951, p. 973B-977B.

In experimental work conducted by Carpenter Steel Co., it was found that rare earths are effective in improving the hot workability of austenitic, or partly austenitic grades of stainless steels containing 4-70% Ni, and 10-60% of elements from the group of Cr, Mo, and W, the amount of any one not to exceed 30%. Photographs of forged-cone specimens, rolled billets, strips, slabs, etc. (Q23, SS)

737-Q. Solid Solution Alloys of Magnesium With Lithium and Indium. W. R. Hibbard, Jr., A. L. Kearney, W. H. Hawley, Jr., and E. C. Burke. *Journal of Metals,* v. 3, Nov. 1951, p. 978-979.

Comparative plasticity, strain hardening, microstructure, and preferred orientation.
(Q23, Q24, M27, Mg, Li, In)

738-Q. Work Hardening-Reannealing Cycle of Pure Silver. Marian Balicki and Goldye Leeds. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 981-986.

Effects of cold work and annealing of various types on elongation, ultimate stress, thermoelectric power of couples (annealed vs. cold-worked Ag), activation energies, frequency coefficients, etc. Results are shown on 2- and 3-dimensional graphs, in which comparison between experimental and calculated values is made. 14 ref.
(Q general, P general, J23, Ag)

739-Q. Effect of Rare-Earth Metals on the Properties of Extruded Magnesium. T. E. Leontis. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 987-993.

The specific effect of various rare-

earth metals on the room and elevated-temperature properties of Mg was evaluated. Alloys containing didymium exhibit the highest tensile and compressive strengths at room and elevated temperatures. All the rare-earth metals increase the creep resistance of extruded Mg at temperatures of 400-600° F., but degree of enhancement depends on temperature and on concentration of the added metal.
(Q27, Q28, Q3, Mg)

740-Q. Torsion Texture of Copper. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1062-1064.

Discussion of above paper (by W. A. Backofen). (Dec. 1950 issue. See item 857-Q, 1950.) (Q1, Q24, Cu)

741-Q. Effect of Alloying Elements on True-Stress True-Strain Flow Curves of Pearlitic Steel. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1065-1066.

Discussion of above paper (R. Raring, J. A. Rinebolt, and W. J. Harris, Jr.). (May 1951 issue, see item 276-Q, 1951.) (Q23, AY)

742-Q. Effect of Ferrite Grain Structure Upon Impact Properties of 0.80 Pct. Carbon Spheroidite. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1064-1065.

Discussion of above paper (by M. Baeyertz, W. F. Craig, Jr., and E. S. Bumps). (Dec. 1950 issue, see item 858-Q, 1950.) (Q6, M27, ST)

743-Q. Fundamental Effects of Cold-Working On Creep Properties of Low-Carbon N-155 Alloys. D. N Frey, J. W. Freeman, and A. E. White. *National Advisory Committee for Aeronautics,* Technical Note 2472, Oct. 1951, 45 pages.

See abstract of "Fundamental Effects of Cold Working on the Creep Resistance of an Austenitic Alloy," D. N. Frey and J. W. Freeman, *Journal of Metals,* item 617-Q, 1951.
(Q3, SS)

744-Q. Experimental Diagrams of Deformation and Strain Distribution in Curved Plates Under Compression. K. B. Jackson and A. H. Hall. *National Research Council of Canada,* Aeronautical Report AR9, 1951, 149 pages.

Data in the form of stress-strain curves for 19 representative plates covering a range of width-to-thickness ratio from 77 to 400, and ratios of plate thickness to radius of curvature from 0 to 1.6×10^{-3}. Specimens were BSS-5L3 and AC17-ST sheet. (Q28, ST)

745-Q. Titanium and Zirconium—Emergency Substitutes for Manganese. William W. Austin, Jr. *Steel,* v. 129, Nov. 5, 1951, p. 110, 112, 115.

Investigations on Ti and Zr as replacements for Mn in steels indicate that these elements not only show good promise as substitutes but also impart some distinctly beneficial properties to fully killed steels. The hot bend impact test was used in the investigation for determining hot short temperature ranges in steels.
(Q23, Q6, ST, Ti, Zr)

746-Q. The Influence of Homogenizing Heat Treatment on Creep Resistance. (In French.) Georges Delbart and Michel Ravery. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Sept. 17, 1951, p. 651-653.

Study on a steel containing 0.12% C, 0.6% Cr, and 0.6% Mo. Treatment was for 300 hr. at 700° C. after different preliminary heat treatments. The degree to which homogenization treatment diminished the creep resistance of steel is interpreted. (Q3, J21, AY)

747-Q. Mechanical Deformation of Metals. (In French.) C. Chaussin. *Métallurgie et la Construction mécanique,* v. 83, Sept. 1951, p. 665, 667, 669, 671.

General consideration of plasticity of monocrystals, deformation by translation, dynamics of translation, and the plasticity of polycrystals. Schematic diagrams. (Q24)

748-Q. Experimental Study of the Plastic Deformation of Metallic Crystals. (In French.) C. Crussard. *Métaux: Corrosion — Industries,* v. 26, July-Aug. 1951, p. 279-291.

Descriptive review of the literature. Various aspects, such as plastic slip of monocrystals, kinking, and creep. 36 ref. (Q24, Q3)

749-Q. Theoretical Study of the Plasticity of Crystals. (In French.) Pierre Laurent. *Métaux: Corrosion—Industries,* v. 26, July-Aug. 1951, p. 292-305.

A review on the basis of the literature. Geometry of dislocations, stress around a dislocation, mobility and origin of dislocations, and formation of dislocations in 2- and 3-dimensional crystals. 21 ref.
(Q24, M26)

750-Q. Various Methods for Perfection of Alloys Having Good Mechanical Properties at High Temperatures. (In French.) A. Guessier. *Métaux: Corrosion — Industries,* v. 26, July-Aug. 1951, p. 310-317.

Procedures and apparatus used

for stainless steels, in addition to classical methods, which make possible extensive testing with a minimum expenditure of time and effort. Advantages of these auxiliary methods. 14 ref. (Q general, SG-h)

751-Q. The Extraordinary Characteristics of Pure, Sintered Aluminum. (In French.) Maurice Victor. *Revue de l'Aluminium,* v. 28, July-Aug. 1951, p. 267-268.

Products made of this material possess improved mechanical properties at room temperature and great resistance to heat. The role of the oxide layer and method for preparation of powdered metal. Results are compared with those obtained from A-U4G, A-SG, and A-UN alloys. (Q general, H10, Al)

752-Q. Reversion of Temper Brittleness. (In French.) L. D. Jaffe and D. C. Buffum. *Revue de Métallurgie,* v. 48, Aug. 1951, p. 609-612; disc., p. 612.

Results of experiments on above phenomenon in SAE 8140 steel. "Reversion" is defined as a break or temporary reversal in the curve of variation of a property with increase in temperature. Certain general rules for the process are indicated. (Q23, AY)

753-Q. Evaluation of Stampability of a Steel From True Stress-Strain Curves and From Data of the K. W. I. Test. (In French.) P. Bastien and C. Winter. *Revue de Métallurgie,* v. 48, Sept. 1951, p. 641-657; disc., p. 658.

Experiments were made on very mild steel containing 0.07% C., 0.035% Mn, 0.030% Si; 0.030% S, and 0.025% P, cold rolled to 0.5-2.9 mm. thickness. Results of various tests. Other tests were done on extra mild steel of various compositions. "K. W. I." tests are described in detail. (Q23, G3, CN)

754-Q. Comparison Among the Influences of Titanium, Columbium, and Tantalum Additions on the Properties of Steel. (In French.) A. Kohn. *Revue de Métallurgie,* v. 48, Sept. 1951, p. 687-711.

The literature is comprehensively reviewed and correlated. Examination of binary and ternary phase diagrams Fe-Cb, Fe-Ta, Fe-Ti, Fe-Cb-C, Fe-Ta-C, and Fe-Ti-C; effects of Cb, Ti, and Ta on properties of Fe and Fe-C alloys; and influence of additions of Ti, Cb, and Ta on properties of different types of stainless and alloy steels. Various mechanical properties and corrosion resistance were determined. 60 ref. (Q general, R general, M24, AY, SS)

755-Q. Investigation of Fatigue Testing Machines by Means of Elongation-Measuring Strips. (In German.) Kurt Fink and Max Hempel. *Archiv für das Eisenhüttenwesen,* v. 22, July-Aug. 1951, p. 265-273, disc., p. 273.

Procedure for checking accuracy of different fatigue-testing machines. (Q7)

756-Q. Mechanical Testing of Gas-Welded Rails. (In German.) H. Kunz and W. Raabe. *Schweissen und Schneiden,* v. 3, Sept. 1951, p. 269-272.

Experimental results show that heat treating welded rails increases their fatigue strength to about 90% of that of unwelded rails and that even the non-heat treated welds are strong enough to meet all requirements. (Q7, K2, CN)

757-Q. Research on the Ductility of Cold Heading Steels. (In German.) Joseph Biligmann. *Stahl und Eisen,* v. 71, Aug. 2, 1951, p. 826-836; disc., p. 836-839.

Tests were made on 13 unalloyed and low-alloy steels that were subjected to different heat treatments and then cold drawn to reduce their cross sections by 0-30%. Plasticity of the steels was found to depend greatly on heat treatment; cold drawing was found to reduce cold workability. 30 ref. (Q23, CN, AY)

758-Q. Recrystallization Textures of Copper Wires. (In German.) Hans Joachim Walbaum. *Zeitschrift für Metallkunde,* v. 42, July 1951, p. 207-210.

Results of experiments. Includes X-ray pictures, micrographs, and graphs. 10 ref. (Q24, Cu)

759-Q. Composite Cables for Open-Air Transmission Lines. (In German.) Karl Kohler. *Zeitschrift für Metallkunde,* v. 42, July 1951, p. 213-216.

Discussion of mechanical properties includes nomograms for determination of conductivity and modulus of elasticity of different sizes of steel-aluminum cables. (Q general, P15, T1, ST, Al)

760-Q. The Influence of Size on Yield Point and Bending Fatigue Resistance. (In German.) Alfred Schaal. *Zeitschrift für Metallkunde,* v. 42, Sept. 1951, p. 279-284.

Tensile and bending tests made on low-alloy Cr-Mn steel, carbon steel, and on Al alloys of different size and cross section to determine effect of size and heat treatment. 18 ref. (Q27, Q5, CN, AY, Al)

761-Q. Wire Resistance Strain Gages for Measurement of Stresses. (In Polish.) W. Tomaszczyk. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 4, 1951, p. 329-349.

Development, theory, production, and applications. Effects of humidity and methods of waterproofing. Includes circuit diagrams. 30 ref. (Q25)

762-Q. Temper Embrittlement in Plain Carbon Steels. Joseph F. Libsch, Arthur E. Powers, and Gopalkrishna Bhat. *American Society for Metals,* Preprint 8W, 1951, 11 pages.

Development of embrittlement in a commercial AISI-1050 steel tempered above 850° F. after hardening. Influence of time and temperature upon the progress of embrittlement is indicated by isoembrittlement curves. It is concluded that plain-carbon steels are highly susceptible to temper embrittlement above 850° F. Degree of embrittlement increases with time and temperature. The new data provide a fundamental basis for re-evaluation of the influence of alloying elements on temper embrittlement, and for reconsideration of its mechanism. 13 ref. (Q23, J29, CN)

763-Q. The Fatigue Properties of Some Binary Alpha Solid Solutions of Aluminum. J. W. Riches, O. D. Sherby, and J. E. Dorn. *American Society for Metals,* Preprint 10W, 1951, 14 pages.

Alloying additions invariably increase the fatigue strength of alpha solid solutions of aluminum; the order of increasing effectiveness per atomic per cent of the added element is: Zn, Ag, Cd, Mg, Ge, and Cu. This is an agreement with the order of increasing effectiveness of alloying elements in improving the plastic properties of alpha solid solutions of Al. (Q7, Al)

764-Q. Overcoming Rheotropic Brittleness: Precompression Versus Pretension. E. J. Ripling and W. M. Baldwin, Jr. *American Society for Metals,* Preprint 11W, 1951, 8 pages.

Brittle behavior at low temperatures, high strain rates, and under severe notched conditions of metals not crystallizing in the face-centered cubic system has previously been shown to be largely strain curable; that is, rheotropic. Prestraining and testing were both tensile strains in the same direction. Shows that subtransition-temperature tensile ductility is also improved by supertransition compressive prestrains in the same direction as the subsequent tensile strain. A difference in the temperature dependence of precompressed steel and Al is also pointed out. (Q23)

765-Q. The Functions of Alloying Elements in the Creep Resistance of Alpha Solid Solutions of Aluminum. A. T. Robinson, T. E. Tietz, and J. E. Dorn. *American Society for Metals,* Preprint 12W, 1951, 33 pages.

Creep data at 422° K. revealed that the creep resistance of a series of high-purity binary alpha solid solutions in aluminum decreased in the order Al-Mg, Al-Cu, Al-Ag, Al-Ge, and Al-Zn. The highest creep resistant alloys Al-Mg and Al-Cu were those which exhibited the highest solid-solution strengthening in tension, the greatest Cottrell Effect, and the highest resistance to recovery. 11 ref. (Q3, Al)

766-Q. Influence of Grain Size on Work Hardening and Fatigue Characteristics of Alpha Brass. G. M. Sinclair and W. J. Craig. *American Society for Metals,* Preprint 14W, 1951, 18 pages.

The relationship between metallurgical grain size and strength properties of 70-30 cartridge brass is discussed from the viewpoint of the "fragmentation" theory of work hardening. Results of hardness, tensile, and fatigue tests performed on the brass appear to be consistent with the concepts of this simple hypothesis. 20 ref.
(Q27, Q29, Q7, M27, Cu)

767-Q. The Embrittlement of Pure Iron in Wet and Dry Hydrogen. James K. Stanley. *American Society for Metals,* Preprint 15W, 1951, 10 pages.

Observation of anomalous impact data on pure Fe led to an investigation of ductility and brittleness occurring in this material when hydrogen-annealed. Simple bend test was devised to determine the extent of brittleness developed in a strip about 0.1 in. thick. Conditions for brittleness in wet and dry hydrogen were established. (Q23, Q5, Fe)

768-Q. A Theory of Rockwell Ball Hardness. M. A. Du Toit Meyer. *Applied Scientific Research,* v. A3, p. 11-26.

A general expression for Rockwell ball-hardness numbers in terms of the Meyer constants n and b is given. Theoretical results are in agreement with experimental results. Conversion of Meyer and Brinell hardness numbers to Rockwell hardness numbers. 11 ref. (Q29)

769-Q. Working Stresses for Helical Springs. O. G. Meyers. *Machine Design,* v. 23, Nov. 1951, p. 135-138, 190.

Maximum allowable design stress is not constant for a given spring material but varies with wire diameter, stress range, and required number of operating cycles. Three types of fatigue-testing equipment especially designed for spring testing. Typical test results and their interpretation. (Q7, Q25)

770-Q. A High-Strength Die Steel That Can Be Cold-Hobbed. G. E. Brumbach. *Machinery* (American), v. 58, Nov. 1951, p. 154-159.

New steel, known by the trade name Super Samson, contains 0.10% C, 0.30% Mn, 0.25% Si, 5.00% Cr,

0.90% Mo, and 0.25% V. This alloy can be annealed to a hardness of about Brinell 125—relatively easy to hob—and can be hardened by cooling in air or oil. High hardnesses are quite stable up to and including 1000° F., and the high alloy content produces good resistance to abrasion. This combination of properties is said to be ideal for cavities used in die casting Zn, Al, and Mg, as well as molds for plastics as requiring temperatures up to 800° F. Typical products. (Q29, Q9, T5, AY)

771-Q. Rupture Properties of Low-Carbon N-155 Type Alloys Made With a Columbium-Tantalum Ferro-Alloy. J. W. Freeman, E. E. Reynolds, and A. E. White. *National Advisory Committee for Aeronautics,* Technical Note 2469, Oct. 1951, 11 pages.

Metallographic examinations were made in as-cast, hot-forged, solution-treated, aged, and rupture-tested conditions. Composition was 20 Cr, 20 Ni, 20 Co, 2 Cb. Vickers hardness tests were made on bar stock in the solution-treated and the aged conditions. (Q26, Q29, SG-b, Fe-n, Cb)

772-Q. Recent Tests on Concrete Beams Reinforced With Chromium Steel; Summarized From Reports of the EMPA. (In German.) *Von Roll Mitteilungen,* v. 10, Mar. 1951, p. 1-11.

Comparison with beams reinforced with ordinary structural steel is made. (Q23, T26, CN, AY)

773-Q. Investigation of the Resistance to Deformation of Metals and Alloys. (In Swedish.) Gunnar Wallquist. *Jernkontorets Annaler,* v. 135, no. 6, 1951, p. 197-218.

Preliminary investigations made to develop simple methods for determining the resistance to deformation of metals and alloys on application of static load or impact. Thirty-nine different materials —7 carbon steels, 25 alloy steels, Al, Cu, brass and 4 Al alloys—were tested at different temperatures. (Q24)

SECTION R

CORROSION

1-R. Developments in Coatings and Cathodic Protection. Carlton L. Goodwin. *Petroleum Engineer,* v. 22, Dec. 1950, p. D35-D37.

Improvements in external corrosion control of underground pipe and possibilities of further reduction of corrosion losses. (R10, CN, CI)

2-R. Resistance to Attack by Liquid Metals. LeRoy R. Kelman, Walter D. Wilkinson, and Frank L. Yaggee. *Metal Progress,* v. 58, Dec. 1950, p. 868-B. From "Liquid Metals Handbook", Office of Naval Research Publication NAVEXOS P-733.

A graphical presentation. Resistance of each solid metal or alloy is given at 300 and 600° C. Qualitative degree of resistance is shown for 16 liquid metals in contact with 30 solid metals at the two temperatures. (R6)

3-R. Alloy Steel Valve Casting Unimpaired After 6 Years' Service. *Steel,* v. 127, Dec. 25, 1950, p. 66. (From paper by T. N. Armstrong and R. J. Greene.)

Results of study indicate no loss of strength, no embrittlement, and no occurrence of graphite in the welded valve casting of Ni-Cr-Mo steel, of approximately WC-4 grade, after exposure to steam at 900° F. for a period of 6 years. (R4, T7, AY)

4-R. Use of Magnesium Alloy Anodes in Ship Protection. K. N. Barnard. *Canadian Journal of Research,* v. 28, sec. F, Nov. 1950, p. 417-437.

See abstract of "Cathodic Protection of an Active Ship in Sea Water," K. N. Barnard and G. L. Christie, *Corrosion;* item 246-R, 1950. (R10, T22, Mg)

5-R. The Corrosion of Steel by Sea Salt of Given Moisture Content. S. J. Duly. *Journal of the Society of Chemical Industry,* v. 69, Oct. 1950, p. 304-306.

Extent of corrosion of mild steel by sea salt is governed by relative humidity of the ambient air. Keeping the moisture content of the salt-complex at 8% or less substantially prevents corrosion from this cause. (R4, CN)

6-R. Heating of Nickel Alloys; Susceptibility to Attack by Sulphur. *Chemical Age,* v. 63, Dec. 2, 1950, p. 783.

(R6, Ni)

7-R. The Oxide Film on Aluminium; Consideration of Experimental Facts. G. Tolley. *Metal Industry,* v. 77, Dec. 8, 1950, p. 255-258.

Protective nature has been definitely established, but there is still insufficient knowledge as to kinetics of formation, and of properties under various conditions. Indicates that a more detailed knowledge of the Al_2O_3 film would give a greater insight into the mechanism of oxidation of metals. 23 ref. (R2, L19, Al)

8-R. Measurement of Potentials in Corrosion Research. (In German.) G. Masing. *Werkstoffe und Korrosion,* v. 1, Nov. 1950, p. 433-437.

Examples and graphed data to show how a simple but systematic study of the potentials of a given metal electrode in an electrolyte can materially aid in understanding of the reactions occurring at the electrode; and, hence, the corrosive behavior of the metal. (R1)

9-R. Corrosion Protection in Cellar Storage. (In German.) H. Netz. *Werkstoffe und Korrosion,* v. 1, Nov. 1950, p. 444-446.

Practical suggestions for prevention of corrosion of metal parts in beverage storage cellars. (R3)

10-R. Corrosion of Preheater Tubes. (In German.) W. Katz. *Metalloberfläche,* sec. A, v. 4, Nov. 1950, p. 161-168.

Causes of corrosion of tin-bronze and aluminum-bronze tubes carry-

ing salt solutions and externally heated with superheated steam were investigated. Corrosion of tin-bronze tubes is explained by the formation of local galvanic currents, while the intergranular corrosion of aluminum-bronze tubes is caused by tensile stresses resulting from the high temperatures of the steam. 10 ref. (R4, Cu)

11-R. Drill Pipes and Tool Joints Undergo Rigid Tests for Fatigue. William S. Bachman. *Drilling,* v. 12, Dec. 1950, p. 20-21, 78.

Both ordinary fatigue and corrosion fatigue, the latter being responsible for most service failures. Results from fatigue tests on full-size, 4½-in., drill-pipe connections. Factors which affect fatigue strength of a drill-pipe connection, and a sample fatigue-strength problem to demonstrate how the higher fatigue-stress values of the newer type connections have practically eliminated failures at tool joints. (R1, Q7, AY)

12-R. The Effect of Copper Undercoats on the Protective Value of Nickel-Chromium Coatings on Steel. B. B. Knapp and W. A. Wesley. *Plating,* v. 38, Jan. 1951, p. 36-38, 45-48, 53-56.

Corrosion tests on panels of high-carbon steel plated with Ni-Cr and with Cu-Ni-Cr showed that composite coatings containing a considerable proportion of Cu were decidedly inferior to Cu-free coatings of equal thickness in normal and salt-containing industrial atmosphere and in a salt-spray test. Both Cu and Fe corrosion products accelerate corrosion of Ni-Cr coatings. A thin coating of Cu under the Ni had a beneficial effect only in the early stages of the atmospheric tests. 12 ref. (R3, Cu, Ni, Cr, ST)

13-R. Corrosion and Corrosion Testing in the Pulp and Paper Industry. R. A. Huseby and M. A. Scheil. *Tappi,* v. 33, Mar. 1950, p. 138-148.

General corrosion, pitting, intergranular attack, stress corrosion cracking, galvanic corrosion, dezincification, and erosion-corrosion, with examples from the pulp and paper industry. Appropriate remedial measures such as alloy selection and heat treatment. The pronounced effect of carbon content on pitting tendency in both laboratory and field tests. Increased corrosion resistance in the ammonium bisulfite process can be effected by keeping Cr content of Type 316 analyses on the high side. Metallurgical considerations in fabrication of alloy-lined equipment. (R1, R2, T29, SS)

14-R. Digester Corrosion; Experience of a Sulphate Mill. Thomas C. Johnson. *Tappi,* v. 33, Oct. 1950, p. 481-484.

A study of corrosion problems experienced in 20 digesters. Although original digester service was 12-14 years, newer digesters installed in 1947 and 1948 appear to be corroding so rapidly that a life of 3-5 years is all that can be expected. Methods for measuring rate of corrosion and inspecting digesters. The steel involved contains 0.30% C, 0.80% Mn, 0.035% P, 0.04% S, and 0.35% Cu. (R5, T29, CN)

15-R. New Corrosion Testing Station. *Marine Engineering and Shipping Review,* v. 56, Jan. 1951, p. 62-65.

New Kure Beach, N. C., station of International Nickel Co. (R11)

16-R. Cathodic Protection at Imperial Dam. Joseph P. Collopy and Waldo D. Freeman. *Engineering News-Record,* v. 146, Jan. 4, 1951, p. 43-44.

System used to prevent corrosion of metallic sections of desilting basins and diversion channels. (R10, ST)

17-R. First Published Kraft Industry Report: Digester Corrosion. Francis W. Flynn. *Pulp & Paper,* v. 25, Jan. 1951, p. 34-35.

Experiences of various companies. Present knowledge and proposed cooperative research. (R5, T29, SG-g)

18-R. The Mechanism of Inhibition of the Corrosion of Iron by Sodium Hydroxide Solution. J. E. O. Mayne, J. W. Menter, and M. J. Pryor. *Journal of the Chemical Society,* Nov. 1950, p. 3229-3236.

When iron, freed from its original oxide film, is immersed in 0.1 *N* NaOH, containing dissolved oxygen, it becomes covered with a thin film of γ Fe_2O_3. It is believed that this film is responsible for passivity and results from a heterogeneous reaction between O_2, dissolved in the solution, and the iron. A deaerated solution of 0.1 *N* NaOH attacks Fe very slowly. (R10, Fe)

19-R. The Corrosion of Iron Covered by a Thin Film of Neutral Salt Solution. W. I. Whitton. *Transactions of the Faraday Society,* v. 46, Nov. 1950, p. 927-938.

Using ½ *N* NaCl solutions and an oxygen atmosphere unusual results are obtained, due to the combined effect of high electrical conductivity of the liquid film and an unrestricted supply of oxygen. Results indicate that acceleration of corrosion of the "oxygen absorption" type may be caused by the catalytic effect of certain impurities them-

selves, and not necessarily of oxide films, on oxygen depolarization action. Several of the results obtained differ from those found for specimens corroding in a restricted supply of oxygen. A simple apparatus for industrial testing. 19 ref. (R2, Fe)

20-R. Solubility and Volatility of Aluminum in Aqueous Solutions or in a Stream of Water Vapor. (In German.) R. Strohecker and Fr. Matt. *Fresenius' Zeitschrift für analytische Chemie,* v. 131, no. 5, 1950, p. 334-341.

Experimentally studied by dissolving Al and several of its compounds in tap water, distilled water, and dilute solutions of NaCl, acetic, tartaric, citric, and oxalic acids. The effect of boiling in the solvent in open and in closed vessels was also investigated. 10 ref. (R4, R5, Al)

21-R. Photoelastic Study of Stresses in Matthaes Test Specimen Developed for Investigation of Corrosion Under Stress. (In Italian.) W. Ruff. *Alluminio,* v. 19, no. 5, 1950, p. 411-415.

Photo-elastic stress-analysis technique. Comparative investigation of "Superavional D" (an Al alloy) by this method and by a tensiometric method showed excellent agreement. (R1, Q25, Al)

22-R. An Electron Diffraction Study on the Corrosion of Metals. (In English). Shigeto Yamaguchi. *Japan Science Review,* ser. 1, v. 1, Mar. 1949, p. 24-31.

Experimental results obtained on a variety of metals over a period of several years are summarized. 10 ref. (R general, M21)

23-R. Corrosion Resistance of a Copper Alloy Containing Chromium. (In Japanese.) Tetsutaro Mitsuhashi and Manabu Ueno. *Journal of Mechanical Laboratory,* v. 4, Mar. 1950, p. 50-53.

Data for alloys containing 65-90% Cu, 5-20% Ni, and 5-25% Cr. (R general, Cu)

24-R. Combating Corrosion in a Chemical Plant With Magnesium Anodes. Oliver Osborn. *Corrosion* (Technical Section), v. 7, Jan. 1951, p. 2-9.

Cathodic protection of steel and cast iron in a chemical plant is economically justified and feasible from an engineering point of view under certain conditions. Specific information concerning practice at Dow Chemical Co.'s Freeport, Texas, plant. (R10, ST, CI)

25-R. Corrosion Inhibitors for Steel. W. G. Palmer. *Corrosion* (Technical Section), v. 7, Jan. 1951, p. 10-19. Reprinted from *Journal of the Iron and Steel Institute.* See item 3-R, 1950. (R10, ST)

26-R. Internal and External Corrosion Experience in Shell's Products Pipe Lines. S. S. Smith, W. J. Curry, and E. H. Rush. *Corrosion,* (Technical Section), v. 7, Jan. 1951, p. 20-27; disc., p. 27-28.

Summarizes 10 years of experience on two product lines using alkaline aqueous $NaNO_2$ as an internal corrosion inhibitor. Figures show short- and long-time effect of nitrite inhibition. Use of Mg anodes as an external corrosion preventative on a products pipe line. Field tests conducted before anodes were installed, after anodes were installed, and over several years of life of anodes. Concludes that proper field testing and installation of Mg anodes can control destructive corrosion sufficiently to extend the useful life of uncoated pipe lines to approximately double their unprotected life. (R10, CN)

27-R. Corrosion Fatigue; The Influence of Disarrayed Metal. D. Whitwham and U. R. Evans. *Corrosion* (Technical Section), v. 7, Jan. 1951, p. 28-40.

Previously abstracted from *Journal of the Iron and Steel Institute,* item 207-R, 1950. (R1, CN)

28-R. Fatigue Testing and Development of Drill Pipe to Tool Joint Connections. William S. Bachman. *World Oil,* v. 132, Jan. 1951, p. 104, 106, 108, 110, 112, 114, 116.

See abstract of "Drill Pipes and Tool Joints Undergo Rigid Tests for Fatigue," *Drilling,* item 11-R, 1951. (R1, Q7, AY)

29-R. Corrosion Control in Water-Flooding. Frederick Latter. *World Oil,* v. 132, Jan. 1951, p. 141-142, 144.

Treatment of water with corrosion inhibitors in the Bradford, Pa., field. (R10)

30-R. Influence of the Quality of Mortar and Concrete Upon Corrosion of Reinforcement. Rachel Friedland. *Journal of the American Concrete Institute,* v. 22, Oct. 1950; *Proceedings of the American Concrete Institute,* v. 47, 1950, p. 125-139.

The variables studied were cement content, water-cement ratio, consistency, grading, and depth of cover. The specimens, stored in moist air or exposed to weather, were tested up to 2 years. Results indicate that there appears to exist an "optimum consistency" at which the quantity of rust is practically unaffected by time. The usual cement contents in reinforced concrete have only a limited corrosion effect. (R6, T26, ST)

31-R. Rate of Dissolution of Silver in Aqueous Ceric Sulfate Solutions. Hugh W. Salzberg, Helen Knoetgen,

and Ann M. Molless. *Journal of the Electrochemical Society,* v. 98, Jan. 1951, p. 31-35.

Results of experimental and theoretical study. Dissolution of Ag and Cu in ceric sulfate is diffusion controlled, in contrast to dissolution in ferric sulfate solutions, which is desorption controlled. By analogy with silver, reactions between oxidants and metals with small differences in standard oxidation potential should be desorption controlled and those with large potential differences should be diffusion controlled. (R5, Ag)

32-R. Some Historical Developments Relating to Corrosion. Wilson Lynes. *Journal of the Electrochemical Society,* v. 98, Jan. 1951, p. 3c-10c.

Chronological arrangement of some developments relating to corrosion, in which references are given to papers and patents considered to be among the significant contributions to advancement of understanding of its nature, or control of its manifestations. Excerpts from a few of the earlier papers. Early developments in the electrochemical concept of corrosion are summarized. (R general)

33-R. How Morton Salt Refines Salt, Fights Corrosion, Handles Solids. James A. Lee. *Chemical Engineering,* v. 58, Jan. 1951, p. 102-105.

Details of equipment layout, materials handling, and materials of construction for corrosion resistance. Includes flow diagrams. Among the alloys used are monel, Type 316 stainless steel, and Ni-Resist. (R6, Ni, SS)

34-R. Corrosion Resistance of Copper and Copper Alloys. Part I. Resistance to Common Corrosives. Part II. Corrosion Rating Chart. Part III. Composition Table. *Chemical Engineering,* v. 58, Jan. 1951, p. 108-112.

Comprehensive tabular data. Includes list of some typical industrial uses. (R5, T29, Cu)

35-R. Construction Materials in the Paper Industry. Part IV. Alkaline Pulping. *Chemical Engineering.* v. 58, Jan. 1951, p. 217-218, 220-221, 222, 224, 225-226.

Short articles on the applicability and corrosion resistance of specific materials for process equipment used in alkaline pulping: "Worthite", W. E. Pratt; "Carbon", L. C. Werking; "Cements", Raymond B. Seymour; "Durimet 20", Walter A. Luce; "High-Silicon Irons". Walter A. Luce; "Chlorimets", Walter A. Luce; "Iron and Steel", Arthur E. May and Albert W. Spitz; "Rubber", James P. McNamee; "Nickel. Nickel Alloys", H. O. Teeple. (R5, T29)

36-R. New Flash Tower Resists High Sulfur Corrosion. L. W. Williams. *Petroleum Refiner,* v. 30, Jan. 1951, p. 144.

Use of stainless-clad steel (Type 405) for flash tower. (R7, T29, SS)

37-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 43, Jan. 1951, p. 69A-70A, 72A.

Shows that properly treated Ti-stabilized 18-8S stainless steel is equivalent to Cb-stabilized material for most practical purposes. Test results with boiling 65% HNO_3. (R10, SS)

38-R. Electrolytic Corrosion and the General Theory of Corrosion. *Gas Times,* v. 65, Dec. 15, 1950, p. 430-432, 437.

General discussion of 2nd Report of the Gasworks Safety Rules Committee, by E. G. Stewart and A. G. Palmer. (R1)

39-R. The Role of Diffusion in Surface Oxidation of Metals. (In French.) J. Bénard. *Métaux & Corrosion,* v. 25, Oct. 1950, p. 241-247.

Investigated for various metals whose density is greater than that of their respective oxides. Kinetics of metal oxidation, mechanism of diffusion in the oxide film, microscopic structure of the oxide film, and influence of the metal-oxide interface on rate of diffusion. 10 ref. (R2, N1)

40-R. Passivation of Stainless Steels in Certain Strong Acids. (In French.) J. M. Defranoux.*Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Oct. 30, 1950, p. 901-903.

Investigated for steels using dilute H_2SO_4 plus 1-2% HNO_3. Influence of surface condition on passivation as a function of temperature and time. (R10, SS)

41-R. (Pamphlet) **2nd Report of the Gas Works Safety Rules Committee. Electrolytic Corrosion and the General Theory of Corrosion.** E. G. Stewart, A. G. Palmer, W. T. K. Braunholtz. *Institution of Gas Engineers,* Copyright Publication No. 374, Nov. 1950, 43 pages.

Types of electrolytic corrosion and test procedures. Interprets results. Practical mitigation of corrosion. Covers cast iron, and carbon and alloy-steel pipe. 64 ref. (R1, CI, CN, AY)

42-R. Corrosion in Amine Gas Treating Plants. F. C. Riesenfeld and C. L. Blohm. *American Society of Mechanical Engineers,* Paper 50-Pet-16, 1950, 24 pages.

Experimental work done with small and full-scale heat exchangers

containing tubes of various steels and alloys. Results indicate that in glycol-amine plants, 4-6 Cr, 0.5 Mo steel and aluminum 3S are suitable for heat-exchanger tubes. Types 304 and 316 stainless steel, monel, Inconel and Carpenter 20 steel were found to be corrosion resistant in systems using aqueous amine solutions. Discusses corrosion of carbon steel in both aqueous and glycol-amine gas-treating plants.
(R9, R5, Al, Ni, AY, CN, SS)

43-R. Sodium Nitrate as an Inhibitor Against the Attack of Sea-Water on Steel. III. Inhibitor in Sea-Water Distilled-Water Mixtures. T. P. Hoar. *Journal of the Society of Chemical Industry,* v. 69, Dec. 1950, p. 356-362.

Shows that corrosion of mild steel by sea-water distilled-water mixtures at 25 or 60° C. is completely inhibited by presence of a percentage of $NaNO_2$ greater than 1/5 of the sea-water percentage. Similar additions inhibit the corrosion of white metal by such waters and decrease the corrosion of Cu. They have no appreciable influence on corrosion of brass at 25° C. Corrosion-potential measurements at 25° C. indicate that the nitrite is an anodic inhibitor. 14 ref.
(R10, CN)

44-R. Electrochemical Behaviour of Paint Films in Sea-Water. A Suggested Mechanism. J. T. Crennell. *Journal of the Society of Chemical Industry,* v. 69, Dec. 1950, p. 371-373.

The cathodic character of painted or otherwise partially screened steel in sea-water is explained by the retention behind the paint-film of the products of reaction of local corrosion couples. Local anodes behind the film will be suppressed by accumulation of ferrous ions. Alkalinity produced at local cathodes renders the steel passive and so encourages passage of further current in the same direction. Experiments show that an iron electrode transferred from neutral to alkaline salt solution becomes temporarily anodic, then quickly becomes cathodic as passivity develops. (R1, ST)

45-R. Ocean Test Tube. Welman A. Shrader. *Aeronautical Engineering Review,* v. 10, Jan. 1951, p. 24-27.

Corrosion and marine-fouling test facilities at Kure Beach, N. C. (R11)

46-R. Results of Recent Tests on Resistance to Weld Decay of Low-Carbon Stainless Steels. G. R. Bolsover. *Sheet Metal Industries,* v. 28, Jan. 1951, p. 73-76.

Results of tests on a series of British compositions in which the specimens were reheated to 650° C. for 30 min., immersed in a boiling $CuSO_4$-H_2SO_4 solution for 72 hr., bent 90° over a radius of 3 ft. and examined by the naked eye for signs of intergranular collapse on the surface. (R2, SS)

47-R. Some Aspects of the Protection of Iron and Steel Against Corrosion. U. R. Evans. *Journal of the Oil & Colour Chemists' Association,* v. 33, Oct. 1950, p. 452-458; disc. p. 457-458.

Mechanism of high-temperature corrosion by water and oxygen, of inhibition of corrosion by Pb soaps, and of corrosion prevention by use of paints containing metallic Zn.
(R1, R10, L26, CI, ST)

48-R. Corrosion of Steel in Laminar Flowing Water. (In English.) J. L. Mansa. *Acta Chemica Scandinavica,* v. 4, no. 8, 1950, p. 1263-1274.

Apparatus and procedure for investigation. Qualitative results. Attempts to obtain quantitative data have not been successful to date.
(R4, ST)

49-R. Corrosion Due to Tuberculation in Water Systems. I. The Effect of Calgon on the Potential of Iron Electrodes in Differential Aeration Cells With Running Tap Water. II. The Effect of Calgon on the Potential of Zinc and Copper Electrodes in Differential Aeration Cells With Running Tap Water. (In English.) J. L. Mansa and Waclaw Szybalski. *Acta Chemica Scandinavica,* v. 4, no. 8, 1950, p. 1275-1299.

Experimental apparatus and results. 38 ref. (R4, Fe, Zn, Cu)

50-R. The Importance of the Reactivity of Metal Surfaces in Electrochemical Reactions. (In German.) Kurt Wickert. *Metalloberfläche,* sec. A, v. 4, Dec. 1950, p. 181-186.

Theoretical analysis and critical discussion of existing theories concerned with the above, as an aid to the better understanding of corrosion problems. (R1, P13)

51-R. Corrosion Resistance of Anodically Polished and "Eloxidized" Aluminum Mirrors. (In German.) W. Kerth. *Metalloberfläche,* sec. A, v. 4, Dec. 1950, p. 190.

Experiments made under corrosive conditions showed that Al mirrors coated with a thin film of Al_2O_3 are highly resistant to corrosion. (R general, L19, Al)

52-R. Attacking Corrosion: Billion-Dollar Problem. *Modern Industry,* v. 21, Jan. 15, 1951, p. 18, 20, 22, 24.

International Nickel Co.'s new Harbor Island corrosion testing station at Wrightsville Beach, N. C. (R11)

53-R. X-ray Diffraction Study of the Oxidation Characteristics of Nickel Pickled Sheet Iron as Related to Enamel Adherence. G. S. Douglas and J. M. Zander. *Journal of the American Ceramic Society,* v. 34, Feb. 1951, p. 52-59.

Systematic study of effect of nickel pickling on oxidation of bare enameling iron and of reactions taking place under groundcoat enamels. 22 ref. (R2, L28, CN)

54-R. Effect of Water on the Interaction Between Benzene Solutions of Palmitic Acid and Metal Oxides. J. K. Lancaster and R. L. Rouse. *Research,* v. 4, Jan. 1951, p. 44-46.

Tingle recently showed that freshly formed metal-oxide surfaces require treatment with water before they will react with a fatty acid. Experiments were planned to discover whether, by use of very dry conditions, chemical reaction would be prevented. Heat changes accompanying the interaction between the fatty acid solution and the powder were followed by means of a calorimeter. Results indicate that reaction rate between a metal oxide and a fatty acid depends on amount of water present; and drops to zero if water is absent. (R5, P13)

55-R. A Micro Solution-Potential Measuring Technique. L. W. Smith and V. J. Pingel. *Journal of the Electrochemical Society,* v. 98, Feb. 1951, p. 48-50.

Solution-potential measurements are used to predict corrosion susceptibility of metals or alloys when exposed to various media. Technique developed for measuring the solution potential of a metal or alloy on a micro scale. Consists of electrically insulating the polished and etched surface of the metal specimen with a transparent plastic film, puncturing the film over any desired microconstituent with the aid of a specially adapted hardness tester, and then determining the solution potential at the point of puncture. (R11)

56-R. Dichromate Reduction Rate at a Steel Surface in Air-Free, Acetic Acid Solution. Norman Hackerman and Ray M. Hurd. *Journal of the Electrochemical Society,* v. 98, Feb. 1951, p. 51-56.

A system by which aqueous solutions of $K_2Cr_2O_7$ and of acetic acid can be brought in contact with steel coupons in the absence of air. Rate of reduction of the dichromate was determined as a function of time by titration and spectrophotometrically. Changes in pH were also followed. Rates were measured with various initial concentrations for several areas of steel surface. Effects of temperature, presence of NaCl or oxygen, and order of addition of the solutions were studied. A mechanism for the reaction and of the corrosion inhibition is proposed. (R1, R10, ST)

57-R. Potential-pH Diagram of Lead and Its Applications to the Study of Lead Corrosion and to the Lead Storage Battery. Paul Delahay, Marcel Pourbaix, and Pierre Van Rysselberghe. *Journal of the Electrochemical Society,* v. 98, Feb. 1951, p. 57-64.

Reactions and equilibrium equations of the system Pb-H_2O are used in the construction of the diagram. Some important features of the diagram, in particular the solubilities of oxides and hydroxides and some of the important oxidation-reduction reactions. Modified forms of the diagram. Important features of the behavior of lead storage batteries on the basis of these diagrams. 11 ref. (R1, Pb)

58-R. Potential-pH Diagram of Silver; Construction of the Diagram—Its Applications to the Study of the Properties of the Metal, Its Compounds, and Its Corrosion. Paul Delahay, Marcel Pourbaix, and Pierre Van Rysselberghe. *Journal of the Electrochemical Society,* v. 98, Feb. 1951, p. 65-67.

The diagram was constructed on the basis of methods and conventions previously described and using the available thermodynamic and electrochemical data. A derived diagram showing domains of corrosion, passivity, and passivation is also presented. 11 ref. (R1, R10, Ag)

59-R. Control of Condensate Return Line Corrosion. William A. Tanzola. *Tappi,* v. 34, Jan. 1951, p. 25-29.

The basic factors involved and mechanism of the corrosion reactions. Sources of the corrosive gases, O_2 and CO_2, and methods of removal of dissolved O_2 and reduction of CO_2. (R4, ST)

60-R. Corrosion. IX. The Protection of Electric Equipment from Corrosion in Pulp and Paper Mills. G. W. Knapp. *Paper Trade Journal,* v. 132, Jan. 19, 1951, p. 18, 20, 22, 24, 26.

Various protective methods. (R5, T29)

61-R. Stainless Steel Castings, Valves and Fittings Beat Corrosion in Paper Industry. N. S. Mott. *Paper Trade Journal,* v. 132, Jan. 26, 1951, p. 31-32, 34, 36.

Typical physical and mechanical properties of cast corrosion resistant alloys for the above; also, alloy recommendations for corrosion resistance to chemicals commonly

used in the paper industry. Includes Ni and high-Ni alloys. 12 ref. (R5, T29, SS, Ni)

62-R. Notes on the Electrochemical Behaviour of Paint Film on Steel in Sea-Water. J. T. Crennell. *Journal of the Society of Chemical Industry,* v. 69, Suppl. Issue 1, 1950, p. S36-S38.

Painted steel surfaces are normally cathodic to bare steel. This is a surprising fact, which appears to contradict the well-established "differential aeration" theory. In seeking an explanation, it was found that neither the chemical nor the physical nature of the paint film is a determining factor; steel imperfectly screened from the electrolyte by any material becomes cathodic. This is in contrast to the preferential corrosion often occurring in crevices. Some practical implications of the observations are suggested. (R1, L26, ST)

63-R. Durability of Aluminium and Its Alloys—Marine Exposure. *Light Metals,* v. 13, Nov.-Dec. 1950, p. 556-563; v. 14, Jan. 1951, p. 36-43.

The theory and practice of test schedules and protective measures. 10 ref. (R4, Al)

64-R. The Influence of Surface Contamination on the Corrosion of Magnesium Manganese Sheet. L. Rakowski. *Metallurgia,* v. 42, Dec. 1950, p. 362-366. (Translated from *Métaux & Corrosion.)*

Previously abstracted from original. See item 6D-35, 1949. (R2, L15, Mg)

65-R. The Effect of Surface Finish on the Stress-Corrosion Properties of Aluminium—7% Magnesium Alloy. S. E. Hadden and E. C. W. Perryman. *Metallurgia,* v. 42, Dec. 1950, p. 392-396.

Stress-corrosion life of the alloy in sheet form, in a susceptible condition, is dependent on state of the surface. Increase in stress-corrosion resistance results from treatments which introduce into the surface compressive stresses acting in opposition to the tensile stresses operating during stress-corrosion. Production of a Mg-impoverished surface layer also causes an improvement. (R1, Al)

66-R. Corrosion-Fatigue of Metals; A Critical Survey. A. J. Gould. *Iron and Steel,* v. 24, Jan. 1951, p. 7-10. 20 references. (R1)

67-R. "White Rust" Formation on Zinc. P. T. Gilbert and S. E. Hadden. *Journal of the Institute of Metals,* v. 78, Sept. 1950, p. 47-70.

Conditions under which Zn corrodes in moist atmospheres with formation of a voluminous white corrosion product known as "white rust" were investigated. The corrosion product usually consisted of basic zinc carbonate, sometimes mixed with zinc oxide. In the absence of CO_2, ZnO only was detected. Rate of corrosion increased considerably when substances such as SO_2, HCl, or organic acids were present in the atmosphere, or when galvanizing-flux residues remained on the Zn surface. Rate of attack decreased in the presence of NH_3 or high concentrations of CO_2. Precautions necessary to avoid white rusting in storage or transit. (R3, Zn)

68-R. Review of Published Information on the Oxidation and Scaling of Copper and Copper-Base Alloys. R. F. Tylecote. *Journal of the Institute of Metals,* v. 78, Nov. 1950, p. 259-300.

Part I: methods used in experimental work on oxidation of metals, including weighing, optical, and electrolytic methods for measurement of oxidation rates, and X-ray and electron-diffraction methods for study of oxide-film structures. Part II: rate of oxidation of Cu and the structure of the films formed. Part III: influence of alloying elements and some effects of variations in the oxidizing atmosphere. Part IV: practical aspects of oxidation, with particular reference to the adherence of troublesome scales. 139 ref. (R2, R11, Cu)

69-R. From a Metallurgist's Notebook; Cracked Brass Pins. H. H. Symonds. *Metal Industry,* v. 78, Jan. 12, 1951, p. 27-28.

Cracking of tin-coated brass pins, mounted on cards, after one week's display in a shop window, was investigated. Results of microstructural examination indicated that stress-corrosion was the cause of cracking. Possible remedies. (R1, Cu)

70-R. Electrochemical and Chemical Corrosion. (In German.) H. Grubitsch, E. Voutilainen, and H. Vayrynen. *Werkstoffe und Korrosion,* v. 1, Dec. 1950, p. 477-481.

Experiments made to study factors which influence the corrosion of iron exposed to residual currents. 31 ref. (R1, Fe)

71-R. Protection of Underground Metallic Structures Against Corrosion. (In Russian.) *Vestnik Akademii Nauk SSSR* (News of the Academy of Sciences of the USSR), v. 20, Oct. 1950, p. 110-111.

The work of Akimov on cathodic protection by use of Mg and Mg-alloy anodes. (R10)

72-R. Pit or Cavity-Corrosion of High Chromium Stainless Iron Caused by Contact With Non-Conductive Substances and Its Prevention. (In English.) Hikozo Endo. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Dec. 1949, p. 349-356.

When the surface of chromium-iron comes in contact with nonconductive substances such as glass, cork, or rubber stoppers, or with noble metals like Pt and Au, a narrow crevice acting as capillary is formed and corrosion takes place in the pit or cavity at the point of contact. Specimens containing 22% Cr, 22% Cr + 3% Mo, 22% Cr + 7% Mo, and 35% Cr annealed at 900° C. and quenched in water from 1090 or 1300° C. were tested in 5% $FeCl_2$ solution to ascertain whether pit or cavity corrosion takes place on bringing them in contact with nonconductors. Mechanism of the phenomenon and prevention of these contact effects. (R2, SS)

73-R. On the Improvement of the Imitation Gold. (In English.) Tosihiko Okamura and Takasi Kimura. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Dec. 1949, p. 473-478.

"Imitation gold" tarnishes upon contact with perspiration. Anti-tarnishing properties of ternary alloys of Cu, Zn, and Al, also effects of fourth elements upon them, were investigated. It was found that $\alpha + \beta$ alloy is generally the most resistant and that a slight addition of Pb, Fe, Mn, or Si imparts tarnish resistance, while addition of Si is followed by a remarkable increase of hardness. (R2, Cu, Zn, Al)

74-R. Corrosion Resistance of Cast Irons in Dilute Acids. (In English.) Ichiro Iitaka and Kazuhiko Sekiguchi. *Reports of the Casting Research Laboratory,* Jan. 1950, p. 4-6.

Experiments on effect of Cr content on acid resistance of cast irons and on effects of added metals on acid resistivity of high-silicon irons. (R5, CI)

75-R. Stress-Corrosion of Austenitic Steels. (In Spanish.) Walter Tofaute and H. J. Rocha. *Instituto del Hierro y del Acero,* v. 3, Apr.-June 1950, p. 101-110.

Mechanism of stress-corrosion, especially for 18-8 steels. Effects of added elements such as Ti, V, W, Mo, and Cb; concentration of Ni and Cr; and resulting crystal structure. (R1, SS)

76-R. Particular Phenomena Accompanying Oxidation of Heat Resistant Steels and Alloys. (In Spanish.) Walter Tofaute and G. Bandel. *Instituto del Hierro y del Acero,* v. 3, July-Sept. 1950, p. 177-186.

Results of a short study, especially formation of protective oxide layers, their composition, crystal structure, and factors involved in such oxide formation. Experimental methods. (R2, CN, AY)

77-R. Heat Resistant Alloy Steels Particularly Suitable for Temperatures Up to 600° C. in the Presence of Water Vapor. (In Spanish.) Walter Tofaute. *Instituto del Hierro y del Acero,* v. 3, July-Sept. 1950, p. 195-202.

Cr-Mo-W-V, Cr-Ni-W, Cr-Ni-W-Ti, Cr-Ni-Ti and Cr-Mn-V steels suitable for 600° temperatures were investigated. Compositions, mechanical and chemical properties, and crystal structure. Methods of mechanical and corrosion testing.
(R4, Q general, SG-g, h, AY, SS)

78-R. Fretting Corrosion in Aircraft and Aircraft Accessories. Adolph E. Rahm and Harry F. Wurster. *Lubrication Engineering,* v. 7, Feb. 1951, p. 22-23, 26-28, 40.

Parts subject to "fretting corrosion" or "friction oxidation" are enumerated for fixed and rotary-wing aircraft. Experiences with helicopter rotor-head main-thrust bearings, including design and lubricant changes made to improve serviceability. Modified test apparatus and procedure developed. Relative merits of brass and steel bearings with three types of surface finish and using ten different lubricants. 16 ref. (R1, Q9, T7, ST, Cu)

79-R. Corrosion by Stray Currents. N. P. Peifer. *American Gas Association Monthly,* v. 33, Feb. 1951, p. 24-26.

How corrosion engineers use stray currents from street-railway and mine-haulage systems for free cathodic protection of pipelines.
(R10, ST)

80-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 43, Feb. 1951, p. 63A-64A, 66A.

"Ringworm" corrosion in oil-well equipment. Results of investigation of this type of corrosion illustrate the importance of metallurgical factors in solving some corrosion problems. (R2, ST)

81-R. Protection of Well Casings Against External Corrosion. R. E. Hammond and S. P. Ewing. *World Oil,* v. 132, Feb. 1, 1951, p. 154-156, 158.

Investigation of leaks in the Loudon Pool, Illinois, caused by external corrosion by the Tar Springs formation, in which permeable salt-water sand overlays the producing zones. It was found that more than 90% of this corrosion was caused

by electrolytic currents. To stop it, insulating nipples or flanges were placed between flow lines and casings. Records before and after insulators were installed indicate an ultimate saving for this group of wells of $1,700,000. (R10, CN)

82-R. Corrosion and Stress Corrosion Properties of a High Strength Aluminum-Zinc-Magnesium-Copper Casting Alloy. R. A. Quadt and E. C. Reichard. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 525-529; disc., p. 529.
(R1, Al)

83-R. Physics of Metals. Oxidation of Steels and of Alloys. (In French.) X. Wache. *Métaux & Corrosion,* v. 25, Nov. 1950, p. 267-276.

Surface oxidation was investigated at high temperatures, with emphasis on Fe, Cu, and Ni-base alloys. In all of the alloys investigated, it was found that distribution of the component elements in the oxide layer does not correspond to their concentration in the original alloy. 17 ref. (R2, Fe, Cu, Ni, ST)

84-R. Phenomena of Internal Oxidation. (In French.) J. Druyvesteyn. *Métaux & Corrosion,* v. 25, Nov. 1950, p. 277-282.

Deals especially with the better-known and simpler types. Diffusion of oxygen in Ag or Cu alloys; mechanical properties of Ag or Cu alloys; microscopic investigation of precipitation in the same alloys; application of thermodynamics to internal oxidation of various nonferrous metals; and lattice dimensions of vacuum-cast Ag and several Ag alloys. 15 ref. (R2, Ag, Cu)

85-R. Oxidation of Cobalt at High Temperatures. (In French.) Gabriel Valensi. *Métaux & Corrosion,* v. 25, Nov. 1950, p. 283-291.

Previously abstracted from *Metallurgia Italiana.* See item 273-R, 1950. (R2, Co)

86-R. Electrochemical Behavior of Iron in Solutions of Oxidizing Agents. II. Anodic Polarization of Iron in Solutions of Oxidizing Agents. (In Russian.) L. Ya. Gurvich and G. V. Akimov. *Izvestiya Akademii Nauk* (Bulletin of the Academy of Sciences of the USSR), Section of Chemical Sciences, Nov.-Dec. 1950, p. 565-572.

Experimental investigation of behavior of iron in HNO_3 solutions of different concentrations (up to 0.1 *N*). Anodic polymerization of iron in solutions of $KMnO_4$, $K_2Cr_2O_7$, and $(NH_4)_2S_2O_8$ was also studied. (R5, R1, Fe)

87-R. A Rapid Method for Control of Quality of Metallurgical Lead. (In Czech.) Jan Kaloc. *Hutnické Listy,* v. 5, Nov. 1950, p. 450-453.

Effect of small amounts of impurities on corrosion resistance of lead to various chemicals. Two methods for rapid quality control: determination of "breakdown" point in H_2SO_4; and an aqua regia test. Dependence of breakdown point on quantity and type of impurity was tested using Pb of less than 99.99% purity. (R5, Pb)

88-R. (Book) **Monel and Some Other High-Nickel Alloys Versus Sulphuric Acid.** 72 pages. 1950. Henry Wiggin & Co., Ltd., Wiggin St., Birmingham 16, England. Gratis.

Effects of temperature, aeration, agitation, and acid concentration on corrosion resistance of monel, nickel, Ni-Resist, Inconel, and other Ni-Cr alloys when attacked by H_2SO_4. Results of numerous corrosion tests made in the plant under actual operating conditions. (R5, R11, Ni)

89-R. Corrosion of Bubble Caps in a Chemical Plant. Clyde W. Day, R. C. Schueler, and E. V. Kunkel. *Corrosion* (News Section), v. 7, Feb. 1951, p. 1.

Corrosion of Types 316 and 317 stainless steel upon exposure to various concentrations of acetic acid at 200-300° F. (R5, SS)

90-R. Ohio River Division Corrosion Problems. J. A. Davenport. *Corrosion* (Technical Section), v. 7, Feb. 1951, p. 42-46; disc., p. 46.

Organization and duties of the Ohio River Div., Corps of Engineers, U. S. Army. Locations of tests conducted in recent years as well as corrosion studies under way and contemplated. Cooperative studies and tests on stainless steels, low-alloy steels, carbon steels, and aluminum. Results of different types of painting tests. Surface preparation necessary before application of the coatings and corrosion caused by atmospheric exposure.
(R4, R3, ST, Al)

91-R. Summary and Conclusions: Report of Protective Coatings Investigation Underwater Exposure Tests, 1941-1949. H. W. Mundt, L. J. Thompson, and S. J. Stacy. *Corrosion* (Technical Section), v. 7, Feb. 1951, p. 50.

Results of inspections and observations of the performance of selected protective-coating systems in submerged fresh-water exposure on the Isthmus of Panama covering a period of approximately 8 years. Zinc metallization is recommended. (R4, L23, ST, Zn)

92-R. Summary and Conclusions: Report of Metals Corrosion Investigation, Immersion Tests Five Years Dur-

ation, Initiated 1941. H. W. Mundt, L. J. Thompson, and S. J. Stacy, *Corrosion* (Technical Section), v. 7, Feb. 1951, p. 51.

Conclusions from report on immersion of a selected group of welded and bare uncoupled ferrous and nonferrous metals in Canal Zone fresh, brackish, and sea waters. (R4)

93-R. Studies on Galvanic Couples: I. Measurement of Electromotive Force and Internal Resistance of Cells During Current Flow. II. Some Potential-Current Relations in Galvanic Corrosion. III. Polarization and Cathodic Protection. H. D. Holler. *Corrosion* (Technical Section), v. 7, Feb. 1951, p. 52-68.

Part I: method of measuring effective emf. and internal resistance of a galvanic cell during current flow. A dry cell was used for demonstration of the method. Part II: a graphic method of expressing electrical characteristics of a galvanic couple is developed by application of Kirchoff's laws to a couple consisting of separate electrodes, each with an ammeter in series. Relations were demonstrated with the iron-magnetite couple. Part III: the mechanism of polarization of a galvanic couple. The roles of electrode potentials and of resistive-potential differences are demonstrated in polarization and cathodic protection. Several methods of showing the relation between polarizing current and galvanic-couple potential. 11 ref. (R1, R10)

94-R. Discussions. *Corrosion* (Technical Section), v. 7, Feb. 1951, p. 69-70.

E. C. Reichard of American Smelting and Refining Co. and Oliver Osborn of Dow Chemical Co. discuss separately "the Use of Cathodic Protection in Conjunction With Paint Coatings—A Progress Report," by W. L. Crosby (Nov. 1950 issue, item 444-R, 1950). (R10, R4, ST)

95-R. Corrosion in Amine Gas Treating Plants. F. C. Riesenfeld and C. L. Hughes. *Petroleum Refiner,* v. 30, Feb. 1951, p. 97-106.

Previously abstracted from *American Society of Mechanical Engineers,* Paper 50-Pet-16, 1950. See item 42-R, 1951. (R9, R5, Al, Ni, AY, CN, SS)

96-R. Practical and Relative Simple Corrosion Tests Found Effective. F. L. La Que. *Petroleum Refiner,* v. 30, Feb. 1951, p. 120-122.

Simple setups for installing corrosion specimens within process equipment. (R11)

97-R. New Inhibitor for Sulfide Corrosion. J. A. Caldwell. *Oil and Gas Journal,* v. 49, Feb. 8, 1951, p. 95, 97.

Work of Humble Oil Co. with an inhibitor known as "Corexit" (composition not indicated). Results, which are charted, have been very encouraging. (R10, R5, ST)

98-R. Corrosion and Field Lining of Sulphate Digesters. T. T. Collins, Jr., S. J. Baisch, and G. T. Vander Velden. *Paper Trade Journal,* v. 132, Feb. 9, 1951, p. 24, 26-27; Feb. 16, 1951, p. 18, 20, 22, 24, 26.

Experiences of Thilmany Pulp & Paper Co., Kaukauna, Wis. 62 ref. (R5, T29, ST)

99-R. Electrolytic Corrosion of Metals. A. E. Durkin. *General Electric Review,* v. 54, Feb. 1951, p. 45-48.

Importance as a design factor in selection of materials. The electromotive series provides a guide in choosing materials that will not give rise to electrolytic corrosion; but it must be supplemented by knowledge of conditions which may introduce exceptions. 12 ref. (R1)

100-R. From a Metallurgist's Notebook: Corroded Brass Fasteners. H. H. Symonds. *Metal Industry,* v. 78, Feb. 2, 1951, p. 86-87.

Spectrographic examination, solubility tests, chemical tests, and corrosion tests were among the methods used to discover the cause of corrosion on brass wallet fasteners. Conclusions indicated that the corrosion was due to the high fatty acid content of the grease in the leather. (R7, Cu)

101-R. Chromic Acid. *Chemical Engineering,* v. 58, Feb. 1951, p. 147, 243-244, 246-248.

Series of short articles on how various materials of construction stand up to chromic acid: "High-Silicon Irons," Walter A. Luce; "Coatings," Kenneth Tator; "Iron and Steel," Albert W. Spitz; "Stainless," Grant L. Snair; "Glass Lining," S. W. McCann; "Rubber Lining," James P. McNamee; "Tantalum," Leonard R. Scribner; "Nickel & Alloys," W. Z. Friend; "Carbon," W. M. Gaylord; "Lead," Kempton H. Roll; "Chemical Stoneware," F. E. Herstein; "Durimet 20," Walter A. Luce; "Chlorimets," Walter A. Luce; "Aluminum," A. B. McKee and A. Fitz; "Wood," Henry B. Smith, III; "Silicones," J. A. McHard and Leon Van Volkinburg; and "Worthite," W. E. Pratt. (R5, SG-g)

102-R. Fatigue Testing and Development of Drill Pipe-to-Tool Joint Connections. William S. Bachman. *Petroleum Engineer,* v. 23, Feb. 1951, p. B36, B38, B40, B42, B44, B46, B48, B50-B51.

See abstract of "Drill Pipes and

Tool Joints Undergo Rigid Tests for Fatigue," *Drilling,* item 11-R, 1951. (R1, Q7, AY)

103-R. Joint Cathodic Protection Systems. *Petroleum Engineer,* v. 23, Feb. 1951, p. D53-D55.

Techniques of design and installation; possible division of responsibilities for construction, operation, and maintenance; and sharing of costs. (R10)

104-R. Interchangeability of Cb and Ta in Type 347 Stainless. W. O. Binder. *Metal Progress,* v. 59, Feb. 1951, p. 219-227.

Studies were made on 18-8 steels containing 0.035-0.07% C using tantalum metal, the ferrocolumbium alloy containing approximately 55% Cb and 5-7% Ta, and a new ferroalloy containing about 40% Cb and 20% Ta. Object was to determine the equivalency of Ta with respect to Cb in preventing intergranular attack, the probable ratio of Cb+Ta to carbon required for practical immunity to intergranular attack, and the effect of a partial substitution of Ta for Cb on the strength and ductility of normal Cb-bearing 18-8 steel at room and elevated temperatures. Results indicate that on an equal-weight basis, Ta is as effective as Cb for promoting high-temperature strength. (R2, SS)

105-R. White Rust on Zinc. *Metal Progress,* v. 59, Feb. 1951, p. 264, 266. Condensed from "White Rust Formation on Zinc," P. T. Gilbert and S. E. Hadden.

Previously abstracted from *Journal of the Institute of Metals.* See item 87-R, 1951. (R3, Zn)

106-R. Corrosion of Marine Condenser Systems. *Metal Progress,* v. 59, Feb. 1951, p. 273-274, 276, 278. Condensed from "Corrosion and Related Problems in Sea Water Cooling and Pipe Systems in the H. M. Ships", I. G. Slater, L. Kenworthy, and R. May.

Previously abstracted from *Journal of the Institute of Metals.* See item 303-R, 1950. (R4, Cu)

107-R. Substituted Amines as Inhibitors in the Acid Corrosion of Steel. Lloyd E. Swearingen and Alfred F. Schram. *Journal of Physical and Colloid Chemistry,* v. 55, Feb. 1951, p. 180-187.

Inhibiting action of ethylamine and of four of its substituted derivatives in the corrosion of steel cathodes by 1.0 *N* H_2SO_4 was investigated. The substituted derivatives were all better inhibitors than the parent substance. The increased inhibiting effect obtained with the derivatives is not due to size or shape of the molecules, but can be explained on the basis of those factors that are altered in such manner as to enhance adsorbability. 20 ref. (R10, ST)

108-R. By the Sea, By the Beautiful Sea. *Chemical and Engineering News,* v. 29, Feb. 26, 1951, p. 798-799.

Picture story of International Nickel Co.'s corrosion-testing station near Wilmington, N. C. (R11)

109-R. Fatigue Tests of Rail Webs. R. S. Jensen. *American Railway Engineering Association Bulletin,* v. 52, Feb. 1951, p. 680-690.

Part of "Report on Assignment 11: Recent Developments Affecting Rail Section," from Report of Committee 4 on Rail. Results of laboratory corrosion-fatigue tests in tap water. (R1, T23, CN)

110-R. Molybdate and Tungstate as Corrosion Inhibitors and the Mechanism of Inhibition. W. D. Robertson. *Journal of the Electrochemical Society,* v. 98, Mar. 1951, p. 94-100.

A comparative study of corrosion inhibition of iron by molybdate, tungstate, chromate, and nitrite. Both molybdate and tungstate are efficient inhibitors and comparable to chromate and nitrite; unlike chromate and nitrite, they do not oxidize ferrous ion and, consequently, the primary mechanism of inhibition probably does not involve coprecipitation of oxidation and reduction products of the metal and inhibitor ion to form a protective oxide film. Therefore, passivating inhibitors need not be oxidizing agents. Inhibition appears to be associated with adsorption at the metal-solution interface. (R10, Fe)

111-R. Potential-pH Diagram of Zinc and Its Applications to the Study of Zinc Corrosion. Paul Delahay, Marcel Pourbaix, and Pierre Van Rysselberghe. *Journal of the Electrochemical Society,* v. 98, Mar. 1951, p. 101-105.

The diagram was constructed on the basis of methods and conventions previously described and using available thermodynamic and electrochemical data. Derived diagrams also show domains of corrosion, passivity, and passivation in the absence and presence of CO_2, bicarbonates, and carbonates. 11 ref. (R1, Zn)

112-R. Relationship of Fly Ash and Corrosion. Joseph P. Ryan. *Journal of the American Concrete Institute,* v. 22, Feb. 1951; *Proceedings,* v. 47, 1951, p. 481-484.

Possible corrosion of steel reinforcing rods for concrete by fly ash contained in the concrete. Work of Chicago Sanitary District and other investigators on the problem. Conclusions indicate that corrosion ef-

fects are minor if fly-ash content is kept under 3%. (R7)

113-R. X-Ray Diffraction Study of the Oxidation Characteristics of Nickel Pickled Sheet Iron as Related to Enamel Adherence. Gordon S. Douglas and Jason M. Zander. *Better Enameling,* v. 22, Feb. 1951, p. 8-12, 14-15, 22-23, 27-28.

Previously abstracted from *Journal of the American Ceramic Society.* See item 53-R, 1951. (R2, L28, CN)

114-R. Pipe-to-Soil Potentials as an Indication of Corrosion. *Oil and Gas Journal,* v. 49, Mar. 1, 1951, p. 65-66.

Technique. (R11)

115-R. Corrosion Mitigation in the North McCallum Field. C. C. Frye, W. L. Giezentanner, and Fred M. Clement. *World Oil,* v. 132, Mar. 1951, p. 138-140, 142.

Severe corrosion of tubing and casing in distillate field production led to a series of operating tests in which various inhibitors were used, with and without plastic-coated tubing. Results and illustrations showing severity of attack. (R10, ST)

116-R. A Corrosion Control Program. L. A. Kellogg. *Gas Age,* v. 107, Mar. 1, 1951, p. 11-13.

Program applied to a recently laid natural gas transmission line near Syracuse, N. Y. (R10, CN)

117-R. Cathodic Protection Measures Stop Cable Sheath Corrosion Failure. W. T. Rose. *Electrical World.* v. 135, Feb. 26, 1951, p. 87-88.

Jacketed cables; rectifiers connected through old cables to force current flow to cable sheaths; tieing of cable sheaths, telephone cable, and multigrounded neutrals to water pipes all contributed to solution of problem. (R10, T1, Pb)

118-R. Corrosion Testing at Sea Horse Institute. W. A. Raymond. *Organic Finishing,* v. 12, Feb. 1951, p. 9-11, 23.

Facilities at new site which replaces the Kure Beach site, formerly used by International Nickel Co. for marine corrosion and fouling tests. (R11)

119-R. Corrosion Problems in the Modern By-Product Coke Plant. C. F. Pogacar and E. A. Tice. *Corrosion* (Technical Section), v. 7, Mar. 1951, p. 76-84; disc., p. 84.

Results of corrosion tests in the various processing steps, and uses of corrosion resistant alloys in some of the newer units. Data were collected through use of spool corrosion tests in plant equipment under conditions of normal plant operation. The materials of construction for equipment, beginning with the evolution of gas in the ovens and ending with its storage in gas holders. (R7, T5, SG-g)

120-R. A New Instrument For Measuring Galvanic Corrosion Currents. H. P. Godard. *Corrosion* (Technical Section), v. 7, Mar. 1951, p. 93-97.

The theory of galvanic corrosion is reviewed briefly. An apparatus for measuring magnitude of a galvanic corrosion current, its theory of application and procedure. Practical application in measuring the protection given to the core of an aluminum alloy by the less noble cladding material. (R11)

121-R. Thermofor Catalytic Cracking Gas Plant Corrosion Survey. Christopher A. Murray. *Corrosion* (Technical Section), v. 7, Mar. 1951, p. 98-108.

Severe corrosion experienced by this plant and representative inspection findings. A complete chemical survey of gas-plant streams for amount and type of corrosives, together with water present. NH_3 and H_2S are the principal corrosives present. (R9)

122-R. Discussions. *Corrosion* (Technical Section), v. 7, Mar. 1951, p. 109-112.

Covers "Aerobic Microbiological Corrosion of Water Pipes", by Erik Olsen and Waclaw Szybalski (Dec. 1950 issue; item 482-R, 1950), and "The Influence of Stress on Corrosion", Julius J. Harwood (Aug. and Sept. 1950 issues; items 296-R and 334-R, 1950). Includes authors' replies. (R1, Fe)

123-R. Corrosion. R. Ergang, G. Masing, G. Wassermann, and W. Wiederholt. "The American FIAT Review of German Science. Vol. 31. General Metallurgy," 1950, p. 345-380.

A general review covering theory of corrosion, stress-corrosion, and corrosion test methods. 169 ref. (R1, R11)

124-R. Role of Dissolved Oxygen During the Inhibition of the Corrosion of Iron by Sodium Phosphate Solutions. *Nature,* v. 167, Jan. 27, 1951, p. 157.

Investigation undertaken to determine the effect of dissolved oxygen on the corrosion rate of iron totally immersed in solutions of sodium phosphate at different pH values. (R10, Fe)

125-R. Aircraft Metallic Materials Under Low Temperature Conditions. P. L. Teed. *Journal of the Royal Aeronautical Society,* Feb. 1951, p. 61-81; disc., p. 81-86.

Chemical aspects (corrosion and wear), physical consequences of low

temperatures, and engineering significance of low-temperature effects. Data for commercial ferrous and nonferrous metals. Includes information on low-temperature transformations. 20 ref.
(R general, Q9, N general)

126-R. Tensile Failure of Carbon and Stainless Steel Wires in the Presence of Water and Hydrogen Sulphide. J. E. Truman. *Metallurgia,* v. 43, Jan. 1951, p. 8-10.

Premature failure of both ordinary and corrosion resisting steels, in conditions of service involving presence of H_2S, were investigated. A combination of tap water and H_2S at room temperature can cause considerable reduction in life of steel specimens stressed to 40% of their maximum stress, although a Cr-Ni-Mo stainless steel showed no visible attack up to 10,800 hr.
(R5, Q27, CN, SS)

127-R. From a Metallurgist's Notebook: Tarnished Tableware. H. H. Symonds. *Metal Industry,* v. 78, Feb. 9, 1951, p. 113.

Dark brown and blue spots on the bowls of silver-plated spoons were investigated. It was found that they were caused by a corrosive atmosphere penetrating through minute pinholes in the paper with which the spoons were wrapped.
(R3, Ag)

128-R. The Blistering of Paint Films. Part II. Blistering in the Presence of Corrosion. J. E. O. Mayne. *Journal of the Oil & Colour Chemists' Association,* v. 366, Dec. 1950, p. 538-547.

An examination was made of the contents of blisters in a film of plasticized polystyrene applied to steel and immersed in seawater. The blisters contained liquid but no gas. Movement of water through membranes of polystyrene was examined under both concentration and potential gradients. It was concluded that the blisters grow mainly by electro-endosmosis, although 4% or more of the contents may be due to hydration or ions, and osmosis may account for a further 6%. 13 ref.
(R2, R4, L26, ST)

129-R. Corrosion Resistance of Alloy Steels Toward Pure and Sulfur-Containing Carbon Monoxide. (In German.) O. Sunden and E. Böhm. *Chemie-Ingenieur-Technik,* v. 23, Jan. 14, 1951, p. 3-4.

Experiments show that only very highly allowed Cr-Ni steels are corrosion resistant when exposed to S-containing CO. (R9, SS)

130-R. Theory of Atmospheric Corrosion of Metals. (In Russian.) N. D. Tomashov. *Uspekhi Khimii* (Progress in Chemistry), v. 19, Nov.-Dec., 1950, p. 716-729.

Reviews the literature on 3 types of atmospheric corrosion (moist, wet, and dry). The relation between oxygen and hydrogen depolarization, role of cathodic inclusions in alloys, protective properties of corrosion products, and means of developing protection against atmospheric corrosion. 12 ref. (R3)

131-R. Metal Parts Corrosion-Proofed in Vapor Envelopes. *Steel,* v. 128, Mar. 12, 1951, p. 100, 103.

Cost of applying and later of removing heavy rust-preventive coatings, sludging, and oil spray on metal parts is eliminated by a packaging method which envelopes parts with a volatile corrosion inhibitor. Applied as a coating to kraft papers, the chemical slowly vaporizes, permeating the air surrounding the metal surfaces and forming an invisible protective film. This film prevents corrosion of parts wrapped in the paper or arrests rust if oxidation has started. Base chemical compound used is dicyclohexylammonium nitrite. (R10)

132-R. Corrosion Resistance of Anodized and Unanodized Titanium; Effect of Common Mineral Acid Solutions. Chuk-Ching Ma and Ernest M. Peres, Jr. *Industrial and Engineering Chemistry,* v. 43, Mar. 1951, p. 675-679.

Corrosion rates were determined by alternate-immersion corrosion testing at 35° C. Behavior of anodized and unanodized metals in selected acid solutions at their boiling points was investigated by total-immersion corrosion testing with aeration. Protective films formed under various conditions were evaluated. Corrosion resistance to Ti was found to depend more upon the oxidizing, reducing, or "neutral" tendencies of the corrosive medium than upon concentration of the medium. 12 ref. (R5, Ti)

133-R. Kinetics and Mechanism of Solid Phase Reactions in Oxide Films on Pure Iron. Earl A. Gulbransen and Roswell Ruke. *Industrial and Engineering Chemistry,* v. 43, Mar. 1951, p. 697-703.

See abstract of "Kinetics of Solid Phase Reactions in Oxide Films on Iron; The Reversible Transformation at or Near 570° C.," *Journal of Metals;* item 472-R, 1950.
(R2, N1, Fe)

134-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 43, Mar. 1951, p. 71A-72A, 74A.

Corrosion resistance of cast iron and its use in varied applications where this property is desired.
(R general, CI)

135-R. A New Inhibitor for Sulfide Corrosion. J. A. Caldwell. *Petroleum Engineer,* v. 23, Mar. 1951, p. B58, B61-B62.

Use of "Corexit," a non-toxic, free-flowing liquid developed by Humble Oil & Refining Co. (R10, ST)

136-R. The Distinguishing Characteristics of Water-Formed Deposits. Frank E. Clarke. *Journal of the American Society of Naval Engineers,* v. 63, Feb. 1951, p. 153-160.

Water-formed deposits can be logically classified as scales, sludges, corrosion products, high temperature oxides and biological deposits, depending on their methods of formation. Unfortunately there is a decided lack of consistency in use of these terms. Fundamental characteristics of deposits in accordance with definitions of the ASTM. (R2, R4, ST)

137-R. Oxidation Kinetics of Nickel and Cobalt. Walter J. Moore and James K. Lee. *Journal of Chemical Physics,* v. 19, Feb. 1951, p. 255.

Results of a study of the oxidations at temperatures high enough that the parabolic rate law is followed, and at pressures high enough that rate constants are virtually independent of pressure. (R2, Ni, Co)

138-R. A Survey of Difficulties Encountered in Burning Heavy Residual Fuel Oils. E. F. Tibbetts, O. L. Wood, Jr., D. Douglas, and V. F. Estcourt. *American Society of Mechanical Engineers,* Paper 50-A-136, 1950, 54 pages.

Results of a letter survey of the petroleum and chemical industries and to a partial extent the power industry. Analyses of oil ashes and ash deposits are tabulated. Effect of the vanadium content of the oil. Effect of various oils on carbon, alloy, and stainless steels and Ni alloys. 11 ref. (R7, AY, CN, SS, Ni)

139-R. Exposure Tests of Galvanized-Steel-Stitched Aluminum Alloys. Fred M. Reinhart. *National Advisory Committee for Aeronautics,* Technical Note 2299, Feb. 1951, 23 pages.

Sheets of 24S-T3 and Alclad 24S-T3 joined to themselves by stitching with galvanized high-carbon steel wire were exposed in a marine atmosphere and in the tidewater to determine service life. Includes micrographs of results. (R3, R4, Al, CN)

140-R. Natural Gas in Ohio: A History. T. H. Kerr. *Engineering Experiment Station, Ohio State University,* Circular 52, Sept. 1950, 116 pages.

History of five Ohio gas companies, gas measuring devices, regulation, storage, pipe, and underground corrosion of cast iron, wrought iron, and steel pipe in different Ohio soils. (R8, CI, Fe, ST)

141-R. From a Metallurgist's Note-Book: Corroded Aluminium Foil. H. H. Symonds. *Metal Industry,* v. 78, Feb. 23, 1951, p. 147-148.

Isolated irregular areas of corrosion were found in a roll of Al foil. Evidence obtained indicated that contamination of the rolling oil was responsible. (R7, Al)

142-R. From a Metallurgist's Note-Book: Faulty Copper Boiler. H. H. Symonds. *Metal Industry,* v. 78, Mar. 2, 1951, p. 167-168.

It was said that the copper from which a small boiler was constructed was faulty and therefore responsible for the boiler's subsequent failure. Results of investigation show that failure was due to reduction of thickness by chemical attack and by progressive oxidation by products of fuel combustion. (R7, S21, Cu)

143-R. Stress-Corrosion of Magnesium Alloys. E. C. W. Perryman. *Journal of the Institute of Metals,* v. 78, Feb. 1951, p. 621-642.

Stress-corrosion of Mg + 5% Al alloy in distilled water and other solutions. Stress-corrosion tests were also carried out on other commercial Mg-base alloys and on high-purity Mg. Susceptibility to stress-corrosion failure of the various commercial alloys tested was consistent with their reported service behavior, the Mg-Mn and Mg-Zn-Zr alloys being more resistant than the Mg-Al alloys. All the alloys tested, and also high-purity Mg, suffered stress-corrosion cracking in 0.5% KHF solution. It is thought that cracking may be associated with minor impurities, e.g. iron, which are known to have a deleterious effect on ordinary corrosion resistance. 21 ref. (R1, Mg)

144-R. Cracking of Aluminum-Magnesium Alloys in Contact With Mercury. (In French.) Pierre A. Jacquet and A. R. Weill. *Revue de l'Aluminium,* v. 27, Dec. 1950, p. 442-451.

The mercury-salt test, frequently used to determine the tendency of Cu alloys to intergranular cracking, was investigated in connection with Al+7% Mg alloys exposed to sea water. Includes X-ray diagrams, photomicrographs, and tables. (To be continued.) (R11, Al)

145-R. An Experimental Contribution to Drop Corrosion. (In German.) F. Blaha. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 82, Feb. 15, 1951, p. 170-175.

Experiments made to investigate the differential aeration theory of ferrous corrosion caused by drops. The experiments were made with drops of different solutions between the poles of an electromagnet and "aerated" by different gases. (R1, Fe)

146-R. The Effect of Dilute Sulfuric Acid on Magnetized Iron. (In German.) G. Wagner. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 82, Feb. 1951, p. 181-183.

Experiments showed that chemical action in the sense of Ehrenhaft's magnetolysis does not exist, since no oxygen was present in the hydrogen evolved. (R5, Fe)

147-R. The Role of Sodium Silicate in Inhibiting Corrosion by Film Formation on Water Piping. Leo Lehrman and Henry L. Shuldener. *Journal, American Water Works Association,* v. 43, Mar. 1951, p. 175-188.

Solutions of different sodium silicates in very low concentration (12-1400 ppm. SiO_2) are shown to achieve an equilibrium between ionic and colloidal silica. Silica is not removed from these solutions by metals until the solid corrosion products of metals form. The siliceous film which inhibits the corrosion process was identified by chemical analysis, microscopic examination, and X-ray diffraction analysis. Describes the film formed by the adsorption compound in galvanized iron and brass piping during service. 11 ref. (R10, Fe)

148-R. Corrosion Resistance of Wrought Iron and Steel Pipe. S. L. Case. *Metal Progress,* v. 59, Mar. 1951, p. 378-384.

Data which indicate that wrought iron and steel do not differ materially in their behavior under corrosive conditions in the soil, concrete, and other environments surrounding radiant heating panels. Differences in corrosion resistance of various wrought irons are often greater than between steel and wrought iron. (R8, Fe, ST)

149-R. Corrosion of Magnesium Alloys. *Metal Progress,* v. 59, Mar. 1951, p. 408. (Condensed from "Stress-Corrosion of Wrought Magnesium Base Alloys", Hugh L. Logan and Harold Hessing.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 175-R, 1950. (R1, Mg)

150-R. Cost of Corrosion. *Metal Progress,* v. 59, Mar. 1951, p. 414, 416, 420. (Extracts from "The Cost of Corrosion to the U. S.", Herbert H. Uhlig.)

Previously abstracted from *Chemical and Engineering News.* See item 6A-118, 1949. (R general, A4)

151-R. Materials of Construction vs. Citric Acid. *Chemical Engineering,* v. 58, Mar. 1951, p. 211-212, 214, 216, 218-220, 222.

Consists of the following brief items: "Worthite," W. E. Pratt; "Coatings," Kenneth Tator; "Cements," Raymond B. Seymour; "Wood," Henry B. Smith; "Glass-Lined Steel," S. W. McCann; "Lead," Kempton H. Roll; "Rubber Lining," J. P. McNamee; "Porcelain," W. V. Lapp; "Silicones," J. A. McHard and J. T. McIntyre; "Tantalum," Leonard R. Scribner; "Iron & Steel,'" Albert W. Spitz; "Durimet 20," Walter A. Luce; "Chlorimets," Walter A. Luce; "High-Silicon Irons," Walter A. Luce; "Aluminum," A. B. McKee; "Stainless Steel," Grant L. Snair, Jr.; "Nickel & Nickel Alloys," W. Z. Friend; "Carbon," J. F. Revilock; "Stoneware," F. E. Herstein; "Porcelain," W. V. Lapp; and "Hastelloy," Edward D. Weisert. (R5)

152-R. Corrosion Control for Cooling Systems of Electric Apparatus. Emil J. Remscheid. *General Electric Review,* v. 54, Mar. 1951, p. 36-40.

Experience indicates that where a coolant circuit is necessary for an essentially iron system the application of anhydrous sodium chromate provides a positive and economical means of preventing corrosion. (R10, ST)

153-R. The Oxidation of Heat-Resistant Alloys in the Presence of Foreign Oxides. J. L. Meijering and G. W. Rathenau. *Philips Technical Review,* v. 12, Feb. 1951, p. 213-220.

Alloys which are protected against corrosion by a dense skin of oxide sometimes show strongly accelerated oxidation when brought into contact with foreign oxides. Oxidation of a series of metals and alloys, based on Fe, Cu, or Ag, was investigated, by bringing into contact with MoO_3 in powder form. Degree of oxidation (penetration depth) was determined by measuring the breaking strength of wires drawn from the respective material and heated in air with and without contact with MoO_3. It is concluded that accelerated oxidation is due to formation of liquid in the protective oxide skin of the alloy. It was possible to explain many peculiarities in the temperature and time dependency of the oxidation. (R1, SG-h)

154-R. The Oxidation of Copper at 350°-900° C. in Air. R. F. Tylecotte. *Journal of the Institute of Metals,* v. 78, Dec. 1950, p. 327-350.

Oxidation rates were measured by a continuous-weighing method. At 615° C. and higher, the coppers oxidize according to parabolic law, and the rate constants are similar for the two types. At lower temperatures, initial stages of oxidation depart significantly from the parabolic mode and the oxidation probably follows a logarithmic law, the rates again being similar for the two types of Cu. However, as the scale thickens, the oxidation conforms more nearly to the parabolic law. 18 ref. (R2, Cu)

155-R. From a Metallurgist's Notebook: Stained Zipper Elements. H. H. Symonds. *Metal Industry,* v. 78, Mar. 9, 1951, p. 187-188, 193.

Failure of zipper elements or teeth by season cracking. The necessary corrosive environment was provided by the free fatty acids present in the leather boots to which the zippers were fitted, and by conditions of storage. Materials were either brass or Ni-plated steel. (R7, Cu, Ni, ST)

156-R. Principles of Air Purification. (In German.) H. Stäger. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, Jan. 1951, p. 1-22.

Methods for study of air-borne solids and their effects on living and inert matter, including corrosion and wear of structures and moving parts exposed to air. Climate and climatology; air as a disperse system; effect of particle-size in processing methods; and of filtration as a separation process. Influence of dust content on behavior of an internal combustion engine. Photographs show wear and corrosion of piston surfaces with and without air and oil filtration. 36 ref. (R3)

157-R. Cathodic Protection of an Active Ship in Sea Water. Part II. K. N. Barnard. *Corrosion* (Technical Section), v. 7, Apr. 1951, p. 114-117.

Appearance of a ship placed in drydock 11 months after Mg anodes were fitted to each bilge keel. No corrosion was observed, except in a few re-entrant places. General condition of the underwater paint was fair and the ship was relatively free from fouling growth. The results show that it is possible and practical to use Mg anodes to protect cathodically an active ship in sea water and that measurement of the "hull potential" is an effective criterion as to how much current should be applied at a given time. (R10, ST)

158-R. Inhibitor Control for Sulfide Corrosion. J. A. Caldwell. *World Oil,* v. 132, Apr. 1951, p. 191-192.

Results of liquid-inhibitor tests in wells with previous histories of many equipment failures demonstrate effectiveness of inhibtor use where margin between production cost and production volume is such that more costly means of control are uneconomic. (R10, ST)

159-R. Corrosion Mitigation in the North McCallum Field. Part 2. Conclusion. C. C. Frye, W. L. Giezentanner, and Fred M. Clement. *World Oil,* v. 132, Apr. 1951, p. 214, 217-218, 220.

Results obtained through the use of commercial inhibitors compared to bare tubing and strings coated with plastics. Findings indicate that liquid inhibitors are effective and that plastic-coated strings are of economic value in reducing the amount of inhibitor required. (R10, ST)

160-R. Effect of Chromium on the Oxidation Resistance of Titanium Carbide. J. D. Roach. *Journal of the Electrochemical Society,* v. 98, Apr. 1951, p. 160-165.

It was found that a small percentage of Cr in recrystallized TiC improves resistance to oxidation at elevated temperatures. Amount of oxidation was determined by increase in weight of specimens of different Cr content after heating in air 650, 850, 1200, and 1400° C. Results show that maximum oxidation resistance, at each temperature, is obtained by addition of 5% Cr. 18 ref. (R2, Ti, C-n)

161-R. A User's Viewpoint—Corrosion Data Helps Select Ventilation Equipment. Joseph W. McWilliams. *Standardization,* v. 22, Apr. 1951, p. 111-114.

Surveys available information and discusses its application. (R general, T27)

162-R. From a Metallurgist's Notebook: Capsule Corrosion. H. H. Symonds. *Metal Industry,* v. 78, Mar. 23, 1951, p. 233.

Investigation of the corrosion of brass or copper capsules fitted to barometers. Various tests were carried out on samples of two liquids with which these capsules were filled in order to determine whether they would cause corrosion or staining. (R5, Cu)

163-R. The Effect of Different Alloying Elements on the Technological Properties of Cast Iron, Especially Its Heat Resistance. (In German.) H. Timmerbeil. *Giesserei,* v. 38, (new ser., v. 4), Jan. 25, 1951, p. 25-29.

Correlates and summarizes data on composition of cast air-heater pipes, compares the thermal resistance and castability of several Al-Si

and Cr-Si alloys, and shows the beneficial effects of Ni and Mo. (R2, E25, CI)

164-R. The Theory of Scaling on Metal Alloys. (In German.) Karl Hauffe. *Metalloberfläche,* v. 5, ser. A, Jan. 1951, p. 1-7.

On the basis of Frenkel's model of formation of holes, scaling is explained as a migration of ions by way of interstitial lattice vacancies. Quantitative relations are explained by the Wagner-Schottky theory. 24 ref. (R2)

165-R. The Problem of the Corrosion of Armatures in Contact With Impregnated Wood. (In German.) F. Moll. *Werkstoffe und Korrosion,* v. 2, Jan. 1951, p. 14-15.

The inadequacy of short-time laboratory tests on wood preservatives, since it was found in practice that they often promote, rather than inhibit, the corrosion of metals joined to, or in contact with, the wood. A corrosion-preventive treatment for wire nails. (R7, R10)

166-R. Rust and Scale Prevention in Hot-Water Plants. (In German.) G. Seelmeyer. *Werkstoffe und Korrosion,* v. 2, Jan. 1951, p. 17-30.

Comprehensive review of the causes of corrosion and scaling includes preventive measures. 34 ref. (R4, ST)

167-R. Literature Survey on Corrosion in Neutral Unaerated Oil Well Brines. H. R. Copson. *Corrosion* (Technical Section), v. 7, Apr. 1951, p. 123-127.

Steel is the only material considered. 46 ref. (R7, ST)

168-R. Addendum: Corrosion Problems in the Modern By-Product Coke Plant. E. A. Tice. *Corrosion* (Technical Section), v. 7, Apr. 1951, p. 128.

Additional spool-test data on three leads, high-Ni alloys, bronzes, stainless steels, cast irons, and mild steel. (Original article appeared in Mar. 1950 issue; see item 119-R, 1951.) (R7, Pb, Ni, Cu, CN, SS)

169-R. Corrosion Resistant Equipment for the Corn Refining Industry. R. W. Flournoy. *Corrosion* (Technical Section), v. 7, Apr. 1951, p. 129-133; disc. p. 133.

A process flow sheet indicates steps for which corrosion data were determined. Corrosion data for starch, dextrose, and by-product manufacture were taken from field and laboratory corrosion tests. Special techniques for determining effect of pitting, intergranular corrosion of welds, and applied stress were used. Determination of metallic contamination by a corrosion test; economic factors employed in evaluating the corrosion data. Corrosion rates and corrosion cost-index values are shown in tables for a number of process steps in the industry. (R11, T29)

170-R. Tower Footing Corrosion. Walter J. Piper and John D. Piper *Corrosion* (Technical Section), v. 7, Apr. 1951, p. 134-140.

Refers to high-voltage transmission towers. Measurement of tower-to-soil potentials was used to indicate condition of the galvanizing on underground portions of these towers. Results of an extensive study of the effects of various factors are tabulated. (R8, ST)

171-R. Discussions. *Corrosion* (Technical Section), v. 7, Apr. 1951, p. 141-143.

Covers "Application of Corrosion Resisting Materials to Railroad Electrical Construction," H. F. Brown, Aug. 1950 issue; and "The Role of Polarization in Electrochemical Corrosion," R. H. Brown, G. C. English, and R. D. Williams, June 1950 issue. Includes authors' replies. (R general)

172-R. New Corrosion Research Facilities Added to Inco Kure Beach Project. *Journal of Southern Research,* v. 3, Mar.-Apr. 1951, p. 6-8. (R11)

173-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 43, Apr. 1951, p. 71A-72A, 74A.

New method for measuring the high-temperature oxidation of iron proposed as a result of a metallographic investigation. (R2, R11, Fe)

174-R. Aqueous Nonflammable Hydraulic Fluids. J. E. Brophy, V. G. Fitzsimmons, J. G. O'Rear, T. R. Price, and W. A. Zisman. *Industrial and Engineering Chemistry,* v. 43, Apr. 1951, p. 884-896.

Research which led to development of nonflammable hydraulic fluids designated as Hydrolubes. The large number of metals occurring in aircraft hydraulic systems posed a difficult problem in corrosion inhibition. However, suitable liquid-phase and vapor-phase inhibitors were found. Wear-reducing additives were developed of the type forming hydrophobic films on steel. 18 ref. (R10)

175-R. Corrosion Mitigation Viewed by Management. H. H. Anderson. *Petroleum Engineer,* v. 23, Apr. 1951, p. D30, D32-D34.

Economic importance of corrosion mitigation in the oil industry. (R7)

176-R. The Quantitative Removal of Corrosion Products From Zinc. E. G. Stroud. *Journal of Applied Chemistry,* v. 1, Mar. 1951, p. 93-95.

In order to estimate quantitatively the corrosion of Zn by the loss

in weight of metal, corrosion products were removed by immersion of the corroded metal in a cold solution of 10% chromic anhydrite to which was added 2% silver chromate and excess strontium chromate. The method, while permitting removal of heavy deposits of corrosion product, prevents attack on the base metal such as would be produced by chlorides and sulfates in the deposit in the presence of chromic acid. (R11, Zn)

177-R. Electrolytic Corrosion Tests in Pressure-Sensitive Electrical Tapes. C. W. Bemmels, Rudolf J. Priepke, and L. D. Fallon. *Electrical Manufacturing,* v. 47, Apr. 1951, p. 129-131, 248, 250, 252, 254.

Pressure-sensitive electrical tapes are used as a means of holding wires and other elements during assembly. The term "electrolytic corrosiveness" refers to the tendency of a tape to corrode copper as a result of current flow when insulating materials are subjected to an electrical potential, particularly in the presence of moisture. Comparison of test methods leads to the conclusion that the "corrosion current" method is preferred. It gives good correlation with a second test method designed to simulate corrosiveness of the test material in contact with enameled wires. (R11, Cu)

178-R. A Study of Several Physical Properties of Electrolytes Over the Temperature Range of 25° C. to −73° C. A. B. Garrett and Samuel A. Woodruff. *Journal of Physical & Colloid Chemistry,* v. 55, Apr. 1951, p. 477-490.

Density, viscosity, electrical conductivity, and freezing point of several solvent-electrolyte systems over the above range. Such data are of specific interest in study of electrolytes and especially in study of the dissolution of metals over this temperature range. (R2, P general)

179-R. Action of Hot Ionized Gases Upon Zirconium and Copper. Andrew Dravieks. *Journal of Physical & Colloid Chemistry,* v. 55, Apr. 1951, p. 540-549.

By measuring changes in electrical resistance, relative reaction rates of Zr at 986° C. with low-pressure nonionized and ionized oxygen, air, water vapor, CO_2, CO, N_2 containing 0.5% O_2, C_2H_6, and technical He were studied. In some cases an acceleration and in others a retardation of the reaction upon ionizing the gas was observed. Oxidation of Cu in both forms of gases was studied at 750° C. A method of recording continuously the progress of oxidation of metal strips. 31 ref. (R2, P13, Zr, Cu)

180-R. (Pamphlet) **Diamond Chromium Chemicals; General Use and Applications.** 1949, 32 pages. *Diamond Alkali Co.,* Union Commerce Bldg., Cleveland.

Bichromate of soda and methods for its analysis, leather tanning, dry colors, dyes, textiles, bichromate dip in the surface treatment of brass and copper, chromic acid, corrosion prevention, wood preservatives, etc. (R10, L14, Cu)

181-R. Protecting Against White Rusting of Zinc Plated Parts. P. T. Gilbert and S. E. Hadden. *Metal Finishing,* v. 49, Apr. 1951, p. 66-69.

Condensed from "'White Rust' Formation on Zinc," *Journal of the Institute of Metals.* See item 67-R, 1951. (R3, Zn)

182-R. How to Protect Your Steel. J. B. Scott. *Chemical Engineering,* v. 58, Apr. 1951, p. 135-138.

Methods used at the Adams Terminal Plant of the Phillips Chemical Co., to protect steel in highly corrosive atmospheres. Dry sand blasting, types of coatings, effect of porosity, optimum coverage, drying time of coating, small scale testing, use of cheaper coatings, and thin edges. (R3, L general, ST)

183-R. Two Power Take-Off Problems Licked in Corrosive Atmosphere. *Inco Magazine,* v. 24, Spring 1951, p. 16.

Use of monel fasteners and pins of "K" monel on V-belts around tanning drums at the Hermann Loewenstein Co., Inc. distributors of buckskin and calf leather. (R7, T29, Ni)

184-R. Hard on Bugs and Hard on Pumps. *Inco Magazine,* Spring, 1951, p. 17.

Corrosion of spraying equipment by farm sprays, weed killers, etc., and use of Ni-Resist pump, manufactured by Hypro Engineering, Inc. (R7, T3, Ni)

185-R. Composite Wire With Many Uses. *Inco Magazine,* Spring, 1951, p. 20.

Advantages of Ni-clad Cu wire in high-temperature and corrosive service.

(R general, T general, Ni, Cu, SG-g, h)

186-R. High Strength Alloy Fights Corrosion in Oil Wells. *Inco Magazine,* Spring 1951, p. 26-27.

Use of Nicloy 9, a low-carbon, 9% Ni steel for tubing. (R7, T28, AY)

187-R. Durability of Aluminium and Its Alloys—The Food Industry. *Light Metals,* v. 14, Mar. 1951, p. 133-138; Apr. 1951, p. 189-194.

Incidence of galvanic attack in the food industry from dairy products, fruit juices, and alcoholic beverages. Concluding part: effects of oils, fats,

and meats on domestic utensils and food containers made of aluminium. (R7, T29, Al)

188-R. Fundamental Researches on Corrosion. U. R. Evans. *Engineering,* v. 171, Apr. 13, 1951, p. 443-444. (A condensation.)

A lecture, emphasizing conclusions based on research at Cambridge, England. Also protection by means of miscellaneous coating types. (R general, L general)

189-R. Contribution to the Study of Pickling Inhibitors. (In French.) G. Batta, L. Scheepers, and L. Bousmanne. *Revue de Métallurgie,* v. 48, Feb. 1951, p. 105-114; disc. p. 114-115.

Theoretical considerations on corrosion inhibitors show that a relationship exists between molecular structure and inhibitory action of organic compounds on Fe, Al, and Ni. The same inhibitors behaved abnormally on Zn; alcohols, aldehydes, ketones, amines, phenols, halogenated hydrocarbons, and CS_2 were investigated. (R10, Fe, Al, Ni)

190-R. Rust-Preventive Processes and Agents in the Technical and Patent Literature. (In German.) Richard Springer. *Metalloberfläche,* v. 5, ser. A, Feb. 1951, p. 22-28; Mar. 1951, p. 43-46.

Reviews literature and patents. 113 ref. (R10)

191-R. Some Basic Considerations With Respect to Formation of Protective Layers on Lead and on Solubility of Lead in Drinking Water. (In German.) Johannes Müller. *Gas- und Wasserfach,* v. 92, Feb. 28, 1951, p. 39-42.

Pros and cons of using lead pipes for drinking water lines. Differences between protective layers on lead and iron. Reactions of water with the lead and with coatings which form on the inside of the pipes; suspensions of Pb compounds and their reactions with cations present in the water. Importance of the absence of porosity in the protective layers. 12 ref. (R4, T4, Pb)

192-R. Chromates as Retarders of Corrosion Caused by Wood Preservatives. (In German.) H. Hadert. *Werkstoffe und Korrosion,* v. 2, Feb. 1951, p. 49-51.

Recommendations as to type and amount of inhibitor for specific wood preservatives. (R10)

193-R. Measuring the Oxide Film on Platinum. (In German.) H. Grubitsch. *Werkstoffe und Korrosion,* v. 2, Mar. 1951, p. 85-89.

Criticizes Todt's method. Shows that the amount of oxide on the Pt surface is proportional to the absolute, not the active, surface. (R2, Pt)

194-R. Materials and Soils. (In German.) L. W. Haase. *Werkstoffe und Korrosion,* v. 2, Mar. 1951, p. 90-93.

Corrosive effects of different types of soil on Fe, Cu, Zn, Pb, and their alloys; chemical effect of soils on cement, asbestos cement, concrete, ceramics, and wood. (R8, Fe, Cu, Zn, Pb)

195-R. Corrosion Behavior of Ferritic and Pearlitic Cast Iron Containing Spheroidal Graphite; A Critical Discussion. (In German.) E. Franke. *Werkstoffe und Korrosion,* v. 2, Mar. 1951, p. 101-103.

Data indicate that neither quantity nor form of graphite in cast iron has any marked effect on resistance to corrosion. 19 ref. (R general, CI)

196-R. Investigation of the Process of Passivation of Iron in the System HNO_3-H_2SO_4-H_2O. (In Russian.) I. Oknin. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 24, Jan. 1951, p. 61-73.

Experimental investigation showed that passivation of a self-soluble metal occurs when the maximum rate of the high-potential cathode process in an oxidizing reaction medium (maximum cathode current density) exceeds the maximum rate of the low-potential, active anode process (maximum anode current density). Mechanisms of anodic polarization are proposed for solution of different compositions. Method of investigation is described and results. 42 ref. (R10, Fe)

197-R. Corrosion of Thin Wires. I. Corrosion of Thin Wires of German Silver, Eureka, Copper, and Iron by Sea Water. (In English.) Hiroshi Yoshisaki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Feb. 1950, p. 96-101.

The manner of progress of corrosion in relation to structural considerations. ("Eureka" is an alloy of 42.32% Ni, 1.13% Mn, balance Cu.) (R4, Cu)

198-R. On the Inhibitor for the Corrosion by Hydrochloric Acid on High-Chromium Steels. (In English.) Hikozo Endo and Saburo Isihara. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Apr. 1950, p. 209-215.

Action of $K_2Cr_2O_7$ as inhibitor for corrosion by HCl of high Cr steels was investigated. Mo added to high Cr steels, so far as it goes into solid solution, is very effective in lowering the minimum quantity of $K_2Cr_2O_7$ and in preventing pit or cavity corrosion of high Cr steels. Was not as effective as Mo with respect to corrosion resistance of high Cr steels. (R10, SS)

199-R. Welding and Stress-Corrosion Cracking. *Metal Progress,* v. 59, Apr. 1951, p. 568, 570, 572, 574, 576, 578, 580. (Condensed from "Stress-Corrosion Cracking in Welded Steel Structures," C. E. Pearson and R. N. Parkins.)

Previously abstracted from *Welding Research.* See item 65-R, 1950. (R1, CN)

200-R. Formation of Oxides on Some Stainless Steels at High Temperatures. H. M. McCullough, M. G. Fontana, and F. H. Beck. *Industrial Heating,* v. 18, Apr. 1951, p. 638, 640, 642.

Previously abstracted from *American Society for Metals,* Preprint 4, 1950. See item 406-R, 1950. (R2, SS)

201-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 43, May 1951, p. 69A-70A, 72A.

A general discussion of the corrosion of underground pipelines, its causes and prevention. (R8)

202-R. Rail Corrosion in the Moffat Tunnel. Walter Leaf. *Corrosion* (News Section), v. 7, May 1951, p. 1.

Methods being tested to minimize corrosion of rail, tie plates, and spikes. (R3, T23, CN)

203-R. A Polarographic Method for the Continuous Determination of the Consumption of Oxygen in Corrosion Tests. Paul Delahay. *Corrosion* (Technical Section), v. 7, May 1951, p. 146-150.

The corroding solution flows at a constant rate in a cell containing the specimen. Concentration of O_2 at the outlet of the cell is measured by a polarographic method. Calculation of the rate of O_2 consumption and a few examples. Various factors which cause rate of oxygen consumption to differ from rate of corrosion. A method for computing relative amounts of ferrous and ferric derivatives resulting from the corrosion of iron. 25 ref. (R11, Fe)

204-R. Current Requirements for the Cathodic Protection of Steel in Dilute Aqueous Solutions. G. R. Kehn and E. J. Wilhelm. *Corrosion* (Technical Section), v. 7, May 1951, p. 156-160.

Laboratory method, based upon colorimetric analysis, for finding the minimum current density required. Minimum current densities determined by this method are compared with those obtained from a Britton curve for each of the two test solutions. Significance of the values determined by these two methods. (R10, ST)

205-R. Corrosion Problems Related to Air Transport Aircraft. O. E. Kirchner and F. M. Morris. *Corrosion* (Technical Section), v. 7, May 1951, p. 161-177.

The problems, their causes and treatment, and prevention of such corrosion by proper design, maintenance of surface treatments and coatings, and cleaning operations. (R3, L general)

206-R. Influence of Temperature on Corrosion Rates in Moving Conditions. F. Wormwell and H. C. K. Ison. *Chemistry & Industry,* v. 15, Apr. 14, 1951, p. 293.

Experiments on influence of temperature and surface finish on corrosion rate of mild steel in 0.1 *N* NaCl in the range 22-30° C. Influence of temperature on corrosion rate is far greater than expected from previous work in stationary conditions or from data in the literature. (R5, CN)

207-R. Electrochemical Behaviour of Paint Films in Sea-Water. J. E. O. Mayne. *Chemistry & Industry,* v. 15, Apr. 14, 1951, p. 293-294.

Data on coated and uncoated mild-steel specimens. (R4, CN)

208-R. Cracking of an Al-Mg Alloy in Contact With Mercury. (Concluded.) (In French.) Pierre A. Jacquet and A. R. Weill. *Revue de l'Aluminium,* v. 28, Jan. 1951, p. 4-10.

Results of experiments which show that there is no relation between microstructure and crack formation in the presence of Hg. Influence of thermal and mechanical treatments, micrographic aspects of cracking, and relation between cracking caused by mercury and stress corrosion. 11 ref. (R6, Al)

209-R. Problems of Material in the Design of Chemical Equipment. (In German.) L. Piatti. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, Mar. 1951, p. 80-91.

Failures and successes of steels in high-temperature, high-pressure reactions in the presence of H_2; corrosion from galvanic, stray, and local currents and from micro-organisms; contact, intercrystalline, transcrystalline, and fatigue corrosion; caustic brittleness; frictional oxidation; cavitational wear; and high-temperature corrosion. Ways of minimizing these effects are indicated. 12 ref. (R1, R2, T29, ST)

210-R. The Scaling Process and Short-Time Tests of the Life of Heat Conducting Alloys. (In German.) Helmut Krainer, Leopold Wetternik, and Carl Carius. *Archiv für das Eisenhüttenwesen,* v. 22, Mar.-Apr. 1951, p. 103-110; disc. p. 110.

Test results for a steel containing 25% Cr and 20% Ni, an alloy of 80% Ni and 20% Cr; and a steel containing 24% Cr and 5.5% Al. Resistance of these alloys to tempera-

ture changes differs widely. Short-time tests indicate that no simple correlation exists between scaling and life. The problems of wire thickness, test temperature and time, and reproducibility of results. 23 ref. (R2, AY, Ni)

211-R. Reactions of Cadmium With Oxides of Carbon. (In Russian.) D. M. Chizhikov, E. I. Khazonov, and A. G. Nikonov. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Jan. 1951, p. 68-73.

Investigation showed that Cd above its boiling point (768° C.) is not subject to oxidation by CO; oxidation of Cd by CO_2 with formation of sooty carbon takes place below 350° C.; oxidation of Cd by CO_2 is significant only near its melting point (319° C.). (R2, Cd)

212-R. The Reaction Between Oxygen and Thorium. Pascal Levesque and Daniel Cubicciotti. *Journal of the American Chemical Society,* v. 73, May 1951, p. 2028-2031.

A study of the oxidation of Th was made in order to make comparison with oxidations of other metals of group IVB of the Periodic table. The reaction was studied in the range 250-700° C. Rate constants for the linear oxidation were measured and energy of activation calculated. (R2, P13, Th)

213-R. Studies in the Corrosion of Metals Occasioned by Aqueous Solutions of Some Surface-Active Agents. I. Copper. H. Holness and T. K. Ross. *Journal of Applied Chemistry,* v. 1, Apr. 1951, p. 158-169.

The action of dilute aqueous solutions of representative anionic, cationic, and nonionic wetting agents on sheet Cu was studied. Three types of water were used—London tap-water, distilled water and tap-water softened by the zeolite base-exchange process. Effects of varying the pH of the solutions from 2 to 12 and of temperature changes were investigated. All results are expressed graphically, and a mechanism is suggested. (R5, Cu)

214-R. Do Salts Used for Ice Control Speed Rusting of Automobiles? *Engineering News-Record,* v. 146, May 17, 1951, p. 39-41.

Arguments on both sides of this question and need for further study. Investigations made in Michigan and Akron. (R6)

215-R. Tracer Method for Evaluating Rust Preventatives. Stanley L. Eisler. *Nucleonics,* v. 8, May 1951, p. 76-79.

Method which has overcome the shortcoming of the testing procedures used to evaluate these compounds during U. S. Army procurement. Comparison data are tabulated. (R11, S19, Fe)

216-R. How Hydrogen Attacks and Damages Steel in Refinery Equipment. R. T. Effinger, M. L. Renquist, A. G. Wachter, and J. G. Wilson. *Oil and Gas Journal,* v. 50, May 17, 1951, p. 99-100, 103-104, 108, 110, 113-114, 117, 130-131, 133-134.

The phenomenon by which hydrogen damages steel in conventional refinery equipment. Limited to the attack which occurs with the types of low-carbon steel commonly utilized in the construction of refinery process equipment and piping. Also limited to the attack associated with aqueous corrosion, in which the hydrogen which penetrates the steel is a product of the electrolytic corrosion cell. 32 ref. (R1, N1, CN)

217-R. Corrosion Program for a Pipe Line. Marshall E. Parker. *Petroleum Engineer,* v. 23, May 1951, p. D68, D70, D72, D74, D76-D80.

Detailed recommendations for planning the program. (R general, CN)

218-R. Taking Corrosion Measurements. Francis Ringer. *Petroleum Engineer,* v. 23, May 1951, p. D115-D116, D118-D120.

The Susquehanna electrolysis meter and vacuum-tube voltmeter, which has been found by Texas Eastern Transmission Corp. and others to be versatile field instruments for use in obtaining various measurements in corrosion investigation and control work on buried pipe, cable, or other structures. (R8)

219-R. Hydrogen Attack on Steel. R. T. Effinger, M. L. Renquist, J. G. Wilson, and A. Wachter. *Petroleum Processing,* v. 6, May 1951, p. 500-504.

Simplified flow diagrams show the basic features of catalytic gas-cracking plants and indicate locations where hydrogen attack may occur. Shell Oil Co. investigations indicated that H_2 attack occurs in low-C steel and is associated with aqueous solutions. (R2, CN)

220-R. Corrosion Cut in TCC Gas Plant. C. A. Murray and M. A. Furth. *Petroleum Processing,* v. 6, May 1951, p. 504-506.

Successful corrosion prevention and control by means of water-removal measures in operation in Texas at a Pure Oil refinery. Method, causes, benefits, and an example of the program. (R10, ST)

221-R. How to Avoid Galvanic Corrosion. *Steel,* v. 128, May 21, 1951, p. 82-83, 104, 106, 109-110.

Definition and practical factors

for control. Al and Mg are of particular importance in dissimilar metal contacts. Crevice corrosion and Mg-assembly protection. (R1, Al, Mg)

222-R. Acid Treatment of Shale Gasoline. Part I. Hydrolysis of the Acid Sludge. R. C. Mathews and G. E. Mapstone. *Journal of the Institute of Petroleum,* v. 37, Mar. 1951, p. 147-157.

Results of an experimental investigation, including a study of corrosion of mild steel pipe by hydrolyzed acid and its inhibition by tar bases. (R5, CN)

223-R. Statistical Study of the Resistance to Corrosion of 18% Cr, 8% Ni Steel in Acid Copper Sulfate. (In French.) J. Bleton, J. Blanot, and P. Bastien. *Soudure et Techniques Connexes,* v. 4, Nov.-Dec. 1950, p. 261-262.

The charts compiled permit immediate prediction of the sensitivity to intergranular corrosion of castings, on the basis of their C and Cr contents. (R2, SS)

224-R. (Book) Bibliographic Survey of Corrosion, 1946-1947. 288 pages. 1951. National Association of Corrosion Engineers, 905 Southern Standard Bldg., Houston, Texas.

Has table of contents, cross references, subject and author indexes, and is arranged in a classification system. Abstract included for each reference. (R)

225-R. The Oxidation of Pure Iron. J. K. Stanley, J. Von Hoene, and R. T. Huntoon. *Industrial Heating,* v. 18, May 1951, p. 814, 816. (A condensation.)

Previously abstracted from *American Society for Metals,* Preprint 5, 1950. See item 407-R, 1950. (R2, Fe)

226-R. Reactivated Warships Prove That "Mothballing" Worked. C. H. Sigel. *Iron Age,* v. 167, May 24, 1951, p. 85-89.

Prevention of corrosion, protective coatings, and prevention of deterioration of nonmetallic materials by moisture, mold, and mildew. (R3, L26, ST)

227-R. Corrosion-Prevention Program for T.C.C. Gas Plant at its Smiths Bluff Refinery. C. A. Murray and M. A. Furth. *Oil and Gas Journal,* v. 50, May 24, 1951, p. 112, 115-116, 118, 120, 122.

Failures and replacements necessary in tubular heat-exchange equipment. Prevention measures and benefits to date of the program. (R10)

228-R. The Use of Cathodic Protection With Conventional Paint Systems. L. P. Sudrabin. *Paint and Varnish Production,* v. 41, May 1951, p. 8-11, 27.

Some of the factors to be considered in the electrolytic degradation of paint films on steel. Encourages further development of underwater coatings to be used in combination with controlled cathodic protection. A potential much in excess of 0.73-0.78 volt will tend to accelerate blistering and destroy the paint film, whereas a lower potential may provide only partial protection. (R10, L26, ST)

229-R. Corrosion of Mild Steel and Mild Steel Welds in Sulphate Digesters. R. A. Huseby and M. A. Scheil. *Tappi,* v. 34, May 1951, p. 202-209.

Relative corrosion resistance of modern semi-killed and fully killed steels; corrosion resistance as related to exact chemical analyses; the effect of surface finish; comparative tests on several mild steel welds—manual and submerged arc; corrosion resistance of several low-alloy, high-tensile steels; data on the galvanic effect obtained by coupling mild steel to several stainless steels and effects of various heat treatments. (R general, T28, CN)

230-R. Application of Wagner's Theory of Scaling in the Development of Heat Resistant Alloys. (In German.) Karl Hauffe. *Zeitschrift für Metallkunde,* v. 42, Feb. 1951, p. 34-43.

Shows that Wagner-Schottky's hole-formation theory and Wagner's work on the scaling of pure metals and alloys can be directly applied to development of non-scaling alloys (not including alloys with precious metals). The problem, in general, is to select the components of the alloy in such a manner that the concentration of disturbance centers in the lattice and the mobility of ions are reduced. 62 ref. (R2, SG-g, h)

231-R. Rust and Its Morphology. (In German.) O. Gerhardt. *Werkstoffe und Korrosion,* v. 2, Apr. 1951, p. 129-131.

Formation, transformation, and structures of surface and "under paint" iron rust. Includes photomicrographs. (R3, M27, Fe)

232-R. The Electrochemical Behavior of Iron. (In German.) K. F. Bonhoeffer. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Mar. 1951, p. 151-154.

Charts and discusses the voltage curves of 11 different types of iron in acid electrolytes. Resistance to polarization was found to be highly dependent on the iron and is definitely related to corrosion rate. The behavior of Fe is qualitatively explained by the kinetic theory of electrochemical equilibrium. (R1, P15, Fe)

233-R. The Expansion of Activation to Passive Iron Electrodes. (In Ger-

man.) U. F. Franck. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Mar. 1951, p. 154-160.

Experimental measuring arrangement. A model experiment shows that the primary cause of the spontaneous expansion process is an unstable state which occurs in the simultaneous presence of active and passive areas on the Fe surface. 22 ref. (R11, Fe)

234-R. Local Galvanic Action and Oxide Coatings on Passive Iron. (In German.) W. Schwarz. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Mar. 1951, p. 170-172.

The gradual drop in the initially high solution rate of Fe in the electrolyte is explained by local galvanic action between oxide and metal; and the additional amount of dissolved Fe was found to be a measure of the oxide coating.
(R1, R2, Fe)

235-R. The Electrolytic and Chemical Passivation and Activation of Iron. (In German.) K. F. Bonhoeffer and U. F. Franck. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Apr. 1951, p. 180-184.

Using the equivalent-current density concept, anodic passivation of Fe in H_2SO_4 and chemical passivation by HNO_3 are studied. This concept is shown to be suitable for dealing with the neutralization of passivity by cathodic treatment or by HCl. (R10, Fe)

236-R. The Tarnishing of Silver in Aqueous Solutions and Properties of the Layers of Tarnish. (In German.) Walther Jaenicke. *Zeitschrift für Elktrochemie und angewandte physikalische Chemie,* v. 55, Apr. 1951, p. 186-193.

Apparatus and procedure for determining the effects of Br, I, and S solutions on Ag. Overvoltage of the corroding Ag electrode was measured against a noncorroding Ag electrode. Graphs and tables indicate effects of time, temperature, and concentration of the solution on corrosion. Conductivity and mechanism of conductivity of the layer of tarnish was also studied. 25 ref. (R2, R5, Ag)

237-R. Hydrogen Attack of Steel in Refinery Equipment. R. T. Effinger, M. L. Renquist, A. Wachter, and J. G. Wilson. *Petroleum Refiner,* v. 30, May 1951, p. 132-144.

Refer to abstract under similar title appearing in *Oil and Gas Journal,* item 216-R, 1951.
(R1, N1, CN)

238-R. Report of Committee A-5 on Corrosion of Iron and Steel. T. R. Galloway, chairman. *American Society for Testing Materials,* Preprint 4, 1951, 19 pages.

Includes report of subcommittee XV on field tests of wire and wire products and proposed tentative specifications for Zn-coated Fe or steel chain-link fence fabric galvanized before weaving. Subcommittee report presents data on atmospheric corrosion testing. Materials tests were mostly bare steel and Zn-coated wires and wire products but Cu-covered and Pb-coated steel wires and Cr and Cr-Ni steel wires are also included.
(R general, ST, Zn, Cu, Pb)

239-R. Vapor Packaging Keeps Rust Off Weapons, Tools. Gilbert Foster. *Iron Age,* v. 167, June 7, 1951, p. 99-103.

Government specification which covers the new rust preventives that inhibit corrosion by surrounding ferrous weapons and machine tools with protective vapor. Readying a grease-coated M-1 rifle for combat required at least 3 hr. of hard work; on the other hand, a weapon in a corrosion-inhibitor wrapper can be fired minutes after it is unwrapped and wiped off. Cleaning damage is also eliminated. (R10, L26, Fe, ST)

240-R. Anodic Corrosion of Lead in H_2SO_4 Solutions. J. J. Lander. *Journal of the Electrochemical Society,* v. 98, June 1951, p. 213-219.

Pure Pb was anodized at various constant potentials in H_2SO_4 solutions. At potentials below those for PbO_2 formation, a layer of tetragonal PbO is formed near the Pb. $PbSO_4$ is formed as an outer layer. The rate of corrosion of Pb was found to increase with increasing temperature and decreasing acid concentration. 10 ref. (R5, Pb)

241-R. Some Preliminary Studies of Positive Grid Corrosion in the Lead-Acid Cell. J. J. Lander. *Journal of the Electrochemical Society,* v. 98, June 1951, p. 220-224.

PbO_2 undergoes a solid phase reaction with Pb to form tetragonal PbO. An intermediate film of PbO_2 is formed by the corrosion process which does not cycle completely to $PbSO_4$. Grid growth appears to be proportional to the depth of corrosion after an initial period. Electrolyte concentration and cycle time are shown to be important factors in the corrosion process under constant-concentration conditions. These effects are discussed in terms of a cycling cell. (R1, Pb)

242-R. The Mechanism and Rate of Dissolution of Titanium in Hydrofluo-

ric Acid. M. E. Straumanis and P. C. Chen. *Journal of the Electrochemical Society,* v. 98, June 1951, p. 234-240.

Ti dissolves rapidly in HF according to the reaction: $2Ti+6HF \rightarrow 2TiF_3+3H_2$. Formation of the trifluoride was confirmed by titration with $KMnO_4$ solution and by measurement of the amount of H_2 evolved. Rate of dissolution of Ti in HF was determined. 19 ref. (R5, Ti)

243-R. The Kinetics of the Oxidation of Cobalt. Earl A. Gulbransen and Kenneth F. Andrew. *Journal of the Electrochemical Society,* v. 98, June 1951, p. 241-251.

The vacuum-microbalance method was used to study the effect of time, temperature, pressure, pretreatment, etc., on rate of the reaction below 700° C. The rate data are interpreted in terms of the transition-state theory and calculated energy and entropy of activation for the reaction. An alternate mechanism to that proposed by Valensi is suggested to account for the reaction $Co_3O_4+Co \rightarrow 4CoO_2$. 25 ref. (R2, Co)

244-R. Materials for Fluorine Control Equipment. G. E. Zima and R. N. Doescher. *Metal Progress,* v. 59, May 1951, p. 660-663.

Service experience with various metallic and nonmetallic materials applied to equipment for handling and storage of fluorine at the Jet Propulsion Laboratory, California Institute of Technology. Design details of tanks, flowmeters, feed lines, valves, etc. Ni and high-Ni alloys were the principal metallic materials used. (R6, T29, Ni)

245-R. The Stability of Analytical Weights, Particularly in Chemical Laboratories. P. H. Bigg and F. H. Burch. *British Journal of Applied Physics,* v. 2, May 1951, p. 126-131.

Analytical weights made of various modern materials, including plated types, were subjected to accelerated corrosion and stability tests in five representative chemical laboratories. As regards stability of mass there was little to choose between the weights of austenitic stainless steel, non-magnetic 80+ Ni, 20% Cr, and plated weights; some weights of specially high-polished stainless steel were, however, slightly superior. (R3, SS, Ni)

246-R. Forms and Methods of Corrosive Attack on Aluminum Alloys. I. Binary Cast Alloys. (In German.) Hans Kostron. *Zeitschrift für Metallkunde,* v. 42, Apr. 1951, p. 107-110.

Corrosion of cast binary alloys is largely determined by the solution potential resulting from grain segregation. The untreated casting is subject to both grain-boundary and internal-grain corrosion. Both heterogenizing and homogenizing processes were found to have destructive effects. (R2, Al)

247-R. Galvanic Behaviour of Aluminum. (In Italian.) L. Cavallaro and Giampaolo Bolognesi. *Metallurgia Italiana,* v. 43, Jan. 1951, p. 13-17.

Results of a series of electrochemical measurements on 99.9935% Al, galvanically coupled with different cathode types. The measurements were made in a 3% NaCl solution, with or without addition of $HgCl_2$. Results, compared with those of other measurements, make it possible to derive a particularly low potential for pure Al under spontaneous corrosion conditions. The values of theoretical and experimental potentials obtained by various authors are critically discussed. 14 ref. (R1, Al)

248-R. Relation Between the Deformation Texture of an Aluminium-Magnesium Alloy and Its Behaviour in the Presence of Mercury. (In Italian.) P. A. Jacquet and A. R. Weill. *Metallurgia Italiana,* v. 43, Feb. 1951, p. 51-65.

See abstract of "Cracking of Aluminum-Magnesium Alloys in Contact With Mercury," *Revue de l'Aluminium,* item 144-R, 1951. (R11, Al)

249-R. Intercrystalline Corrosion of Alloys. (In Russian.) G. V. Akimov. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Chemical Sciences, Jan.-Feb. 1951, p. 13-25.

Analyzes different theories of intercrystalline corrosion and strongly emphasizes the theory of polyelectrode systems. A new "microelectrochemical" method of investigation makes it possible to plot a true polarization (corrosion) diagram, thus presenting an objective electrochemical characterization of the process of interaction of crystallites and their boundaries. Briefly reviews protective methods against intercrystalline corrosion. 25 ref. (R2, R11)

250-R. Influence of Concentration of Acids and Their Aggressiveness in Relation to Carbon Steel. (In Russian.) S. A. Balezin and T. I. Krasovitskaya. *Zhurnal Prikladnoi Khimii* (Journal of Applied Physics), v. 24, Feb. 1951, p. 197-202.

Investigation of rate of solution of eight types of carbon steels in H_2SO_4, HCl, and CH_3COOH at different concentrations established that the activity of these acids is

related to their aggressiveness toward carbon steel by the general formula: $\rho = Ka^n$, where K and n are constants, n being characteristic of a specific acid. (R5, CN)

251-R. Protecting Iron From Atmospheric Corrosion by Oil Coatings. (In Russian.) A. Ya. Drinberg and M. G. Rokhlin. *Zhurnal Prikladnoi Khimii* (Journal of Applied Physics), v. 2, Feb. 1951, p. 210-214.

Experiments on production and testing of different oils and unpigmented coatings. Oils studied include tung oil, linseed oil, and cottonseed oil. Effects of aging up to 6 months. (R3, L26, Fe)

252-R. Protecting Iron From Corrosion With Oil Coatings and Change of Physical Properties of the Latter During Aging. (In Russian.) A. Ya. Drinberg and M. G. Rokhlin. *Zhurnal Prikladnoi Khimii* (Journal of Applied Physics), v. 24, Feb. 1951, p. 215-220.

Apparatus designed to simulate atmospheric conditions plus accelerated aging for study of corrosion protection and physical properties of tung, linseed, and cottonseed oils. Data obtained by use of this apparatus. (R11, R3, L26, Fe)

253-R. Change of Elementary Composition of Oil Films Under Different Aging Conditions. (In Russian.) A. Ya. Drinberg and M. G. Rokhlin. *Zhurnal Prikladnoi Khimii* (Journal of Applied Physics), v. 24, Feb. 1951, p. 220-222.

Detailed investigation showed that films based on pentaerythrate esters of acids of semidrying oils give the best corrosion protection and those based on tung oil, the worst. Influence of different conditions of aging during testing on composition of oil films. (R11, L26, Fe)

254-R. Protecting Water Works Steel Structures Cathodically. Frank P. MacDonald. *Corrosion* (News Section), v. 7, June 1951, p. 1.

Practice of the Cincinnati waterworks. (R10, CN)

255-R. Rosin Amine-Ethylene Oxide Condensates as Corrosion Inhibitors for Mild Steel in Hydrochloric Acid. Edward A. Bried and Harry M. Winn. *Corrosion* (Technical Section), v. 7, June 1951, p. 180-185.

Condensates of ethylene oxide with Rosin Amine D containing 1-31 moles of ethylene oxide per mole of Rosin Amine D were found to act as corrosion inhibitors for mild steel in HCl. The condensate containing 5 moles of ethylene oxide was the most efficient. Other nitrogenous organic materials were found to be less efficient as inhibitors under the conditions tested. 16 ref. (R10, CN)

256-R. Testing Inhibitors of Brine Drippings Corrosion of Railway Tracks and Equipment. G. M. Magee. *Corrosion* (Technical Section), v. 7, June 1951, p. 186-188.

Initial studies indicated that addition of sodium dichromate neutralized with soda ash to the salt and ice in the bunkers of the cars would effectively prevent corrosion from brine drippings. However, because of toxicity of the dichromate it was found necessary to add the inhibitor externally by passing the brine drippings through a suitable filter in order to avoid contamination. Cost of servicing filters appears questionable economically. Later studies indicate that Soldium Polyphos is equally effective and since it is nontoxic can be added directly with the salt. (R10, Fe)

257-R. Some Applications of Organic Corrosion Inhibitors in the Petroleum Industry. Charles M. Blair, Jr. *Corrosion* (Technical Section), v. 7, June 1951, p. 189-195.

Emphasis on applications in oil and gas wells. Mechanics of inhibitor use and recommended methods of application. Corrosion-rate data for a number of typical systems. Mechanism of action of organic inhibitors in reducing corrosion rates of metals. Laboratory and field data on the relation between inhibitor concentration and corrosion rate are analyzed and compared with predictions derived from adsorption theory. 15 ref. (R10, T28, Fe, ST)

258-R. Corrosion of Railroad Hopper Car Body Sheets. B. J. Kelly. *Corrosion* (Technical Section), v. 7, June 1951, p. 196-201.

Information obtained from a large number of tests of various materials exposed in different kinds of atmospheres was correlated with data obtained from service tests of a few of these materials. Examination of hopper-car bodies constructed of carbon steel, copper steel, and high-strength steels showed that failures in the sheets generally occur in areas where lap joints of ledges permit accumulation of moisture, dirt and fines, and in areas adjacent to stiffening members. (R3, T23, AY, CN)

259-R. Cathodic Protection Technical Practices. Bulletin III. *Corrosion* (Technical Section), v. 7, June 1951, p. 202-209.

Last of a series of bulletins prepared by the Correlating Committee on Cathodic Protection of the NACE. 57 ref. (R10)

260-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 43, June 1951, p. 89A-90A.

Two new precipitation-hardening stainless steels developed by Armco Steel Corp. are designated 17-7PH and 17-4PH. 17-7PH is 17% Cr, 7% Ni and 17-4PH is 16.5% Cr, 4.25% Ni, 4% Cu. Mechanical properties are tabulated.
(R general, Q general, SS)

261-R. Liquid Vapor Corrosion Inhibitors. H. R. Baker and W. A. Zisman, *Lubrication Engineering*, v. 7, June 1951, p. 117-122.

Progress of post-war research on polar-type rust inhibitors. Structure of soaps and amine-acid complexes, colloid state of polar compounds in non-aqueous systems, adsorption on metals, and the mechanism of corrosion inhibition. Advances in rust-inhibition test methods, including recent work on vapor-work inhibitors. 40 ref. (R10)

262-R. Victory Over Bromine. Albert R. Jasuta. *Modern Packaging*, v. 24, June 1951, p. 117-121.

Development of special monel drums to contain liquid bromine. Results of corrosion tests on carbon steel, Pb, Teflon, Hastelloys A, B, and C, Monel, Ni, polyethylene, Dow metal M, and Haynes Stellite 19P. Diagrams show details of construction of the drums and of suggested emptying system.
(R6, Ni, CN, Pb, Mg)

263-R. Corrosion, Pickling, Inhibition, and Passivation of Metals. (Or Oxidation, Deoxidation, and Antioxidation.) (In French.) J. Frasch. *Métaux Corrosion—Industries*, v. 26, Feb. 1951, p. 81-94.

Attempts to show the intimate relationship between above processes. Factors and mechanisms involved. Confined to ferrous metals. 12 ref. (R10, L12, Fe, ST)

264-R. The Theory of Oxidation of Metals and Metallic Alloys. (In German.) K. Hauffe. *Werkstoffe und Korrosion*, v. 2, Apr. 1951, p. 131-139.

Reviews literature. Lattice structure as a factor in metallic oxidation. Wagner's theory of the oxidation of pure metals. 58 ref. (To be continued.) (R2)

265-R. Report of Subcommittee II on Performance Tests (To be Appended to Annual Report of Committee B-8 on Electrodeposited Metallic Coatings); Atmospheric Exposure of Copper-Nickel-Chromium Deposits on High-Carbon Steel. H. A. Pray, chairman. *American Society for Testing Materials*, Preprint 13S, 10 pages.

Extensive tabular data and conclusions. Panels were exposed at five locations for 1.5-3.5 yrs.
(R3, Cu, Ni, Cr, CN)

266-R. Role of Oxide Composition in Oxidation of Nickel and Cobalt. Robert L. Tichenor. *Journal of Chemical Physics*, v. 19, June 1951, p. 796-797.

Moore and Lee found the rate of oxidation of Co at 500-800° C. in O_2 to be 25 times greater than that of Ni although activation energy is the same for both reactions. Alternative explanations for this phenomenon. By use of certain assumptions, good agreement between calculated relative rates of diffusion and observed relative rates of oxidation was obtained. (R2, Co, Ni)

267-R. Hot Dip Galvanizing. Wallace G. Imhoff. *Industrial Gas*, v. 29, June 1951, p. 6-7, 22-25, 27.

Some of the causes that result in failure at the top of the galvanizing pot. Shortcomings of the old sal ammoniac-muriatic acid dip flux technique still used by many companies. Use of Zn ammonium chloride is recommended. Other causes of failure. (R6, L17, ST, Zn)

268-R. Nickel Alloys Versus Sulphuric Acid. *International Chemical Engineering & Process Industries*, v. 32, June 1951, p. 284-286.

Corrosion resistance of Ni alloys to H_2SO_4 as encountered in the chemical process industries. Considers each of a variety of chemical processes and suitability of different alloys for contact with the different materials and conditions involved.
(R5, T28, Ni)

269-R. Stress Corrosion of Cast Bronzes Evaluated. J. T. Clenny. *Iron Age*, v. 167, June 21, 1951, p. 85-89.

Tests of ten cast Cu alloys under stress in an NH_3 atmosphere indicate that Al bronzes (10% Al) offer the best resistance. Four different methods of evaluating the test results were used, including determination of stress-corrosion endurance limits and percentages of loss of tensile strength due separately to stress and corrosion. (R1, Cu)

270-R. Corrosion Resistance of Wrought Iron and Steel Pipe. Elmer Gammeter. *Metal Progress*, v. 59, June 1951, p. 814-815.

Comments on article by S. L. Case (Mar. issue; item 148-R, 1951). Tabulates some data obtained over relatively short periods in industrial and residential areas. (R8, Fe, ST)

271-R. Titanium Resists Stress Corrosion. H. H. Uhlig and J. R. Cobb, Jr. *Metal Progress*, v. 59, June 1951, p. 816.

Tests were made in boiling saturated $MgCl_2$ and also in 10% NaOH. No cracking took place. (R1, Ti)

272-R. Rust—How to Combat It by Proper Design. H. Malcolm Priest. *Railway Mechanical and Electrical Engineer*, v. 125, June 1951, p. 43-50, 60.

Design recommendations made to minimize corrosion of railway rolling stock. (R general, T23, ST)

273-R. The Effect of Silicates on Digester Corrosion. J. C. Hair and A. W. Duskin. *Tappi,* v. 34, June 1951, p. 252-254.

In an attempt to decrease corrosion rate in its digesters (made of ASTM A-10 steel) Crossett Paper Mills added solium silicate and high-silica clays to the liquor system with the anticipation that a protective scale would be formed in the digesters, and corrosion thereby inhibited. Results were negative. (R6, AY)

274-R. Kinetics of the Formation of Oxide Films on Zinc Foil. Walter J. Moore and James K. Lee. *Transactions of the Faraday Society,* v. 47, May 1951, p. 501-508.

Oxidation kinetics of Zn foil at temperatures from 300 to 400° C. and pressures of 1.0-40.0 cm. of Hg. Below 350° C., the rate follows a logarithmic equation. Above 370° C. it follows a parabolic equation. Parabolic rate constant is markedly pressure dependent. This behavior can be interpreted in terms of activated adsorption of O_2 at the ZnO surface. 14 ref. (R2, Zn)

275-R. Periodic Phenomena in the Corrosion of Metals by Vapors. (In French.) R. Dubrisay. *Bulletin de la Société Chimique de France,* Nov.-Dec. 1950, p. 1058-1060.

When a thin sheet of Ag or Cu with a small hole in it is placed over a test tube containing a fragment of iodine, concentric colored rings form around the hole, due to decreasing thickness of iodine formed at increasing distances from the hole. A quantitative study was made of this phenomenon for various periods of time and temperatures up to 70° C. Effects of various factors are thoroughly analyzed. (R9, Ag, Cu)

276-R. Action of Anhydrous Hydrogen Chloride Gas on Beryllium, Magnesium, and Their Oxides. (In French.) Jean Besson. *Bulletin de la Société Chimique de France,* Nov.-Dec. 1950, p. 1175-1179.

Action on above and on alkaline-earth metals, Hg, Zn, and Cd at temperatures up to 1000° C. Be, Mg, Zn, and Cd form chloride films at ordinary temperatures which protect the metal from further attack by HCl gas. This protective action disappears at the fusion point of the chloride layer. 12 ref. (R9, Be, Mg)

277-R. Change in Corrosion Behavior Caused by Wetting Agents. (In German.) Luigi Piatti. *Chimia,* v. 5, Jan. 15, 1951, p. 8-11.

Experiments on the corrosion effect of plain tap water and of tap water with 4% wetting agent on carbon-steel plates show that the wetting agent prevents pitting and results in more uniform corrosion. (R4, CN)

278-R. Experiments on the Zinc-Iron Cell. (In German.) K. Wickert and H. Wiehr. *Werkstoffe und Korrosion,* v. 2, May 1951, p. 165-171.

In model elements for O_2 concentration cells with Fe electrodes, internal resistances are built up. When the metal surfaces are mechanically altered, these resistances cause loss of metal at the cathode, varying with surface condition. Shows that it is useful to include electrochemical as well as mechanical surface activation in the theory of the active surface. Recommendations for cathodic protection of Fe on the basis of a theory that the electrochemically dependent change of activity of a metal surface is caused by the inhibiting effect of electron-acceptors at the cathode. (R1, R10, ST)

279-R. Influence of Thermal Treatment on Rate of Cracking of Carbon Steel Caused By Ammonium Nitrate. (In Polish.) M. Smialowski, E. Gasior, and C. Bieniosek. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 1, 1951, p. 17-22.

Studied for samples of sheet steel containing 0.11% C and 0.034% Al under constant tension and immersed in a 40% aqueous solution of NH_4NO_3, at 98° C. Analysis of the results indicates that the form and the distribution of the cementite phase in steel is related to the rate of cracking. Fe_3Cu is cathodic with respect to Fe and opposes the action of nitrate; but its presence causes the formation of local cells which accelerate the anodic dissolution of material at the grain boundaries. (R1, CN)

280-R. Dezincification of Aluminum Brass Condenser Tubes Prevented by Chlorination and Cleaning. C. L. Bulow. *Corrosion* (News Section), v. 7, July 1951, p. 1.

Effectiveness of the procedure. (R2, L12, Cu)

281-R. Bacterial Casing Corrosion in the Ventura Field. Keith Doig and A. Wachter. *Corrosion* (Technical Section), v. 7, July 1951, p. 212-224.

Possible causes considered and the more important preventive methods, namely cathodic protection, insulating flanges on wellhead connections, protective coatings, extra casing strings, and full-string cementing. It was concluded that bacterial ac-

tivity is responsible for the corrosion. Methods for inhibiting or destroying the bacteria were developed. (R1, ST)

282-R. Corrosion in the Ammonolysis of Aliphatic Chlorides. R. S. Tresker and R. F. Miller. *Corrosion* (Technical Section), v. 7, July 1951, p. 225-228.

Corrosion data are presented for a process for manufacture of methallylamine by high-pressure liquid-phase ammonolysis of methallyl chloride. Relative corrosion resistance of a number of alloys was determined for the two most severely corrosive process streams encountered. Study of other combinations of amines and aliphatic chlorides revealed such combinations to be generally corrosive to carbon steel and other common alloys under moderately high temperature conditions. (R7, CN)

283-R. The Corrosion of Titanium in Acids; The Rate of Dissolution in Sulfuric, Hydrochloric, Hydrobromic and Hydroiodic Acids. M. E. Straumanis and P. C. Chen. *Corrosion* (Technical Section), v. 7, July 1951, p. 229-237.

It was found that rate of dissolution of Bureau of Mines titanium in H_2SO_4 and HCl below 2 *N* is extremely low. The rate is still lower in HBr of all concentrations. HI does not react at all with purest Ti. Its resistivity can be explained by the formation of protective layers, which are easily dissolved by HF. Therefore, small amounts of NH_4F, added to the above acids, accelerate greatly the rate of dissolution even in HI. 15 ref. (R5, Ti)

284-R. Stress Corrosion: Its Relation to Other Types of Corrosion. U. R. Evans. *Corrosion* (Technical Section), v. 7, July 1951, p. 238-244.

Corrosion damage is classified into general (unlocalized) corrosion, pitting, general intergranular corrosion, stress corrosion, and corrosion fatigue. Of these, the first causes least weakening, while the last two cause the most weakening. Stress corrosion differs from corrosion fatigue in requiring pre-existing paths of weakness; thus it occurs only on some materials after certain heat treatments. Preventive measures are briefly surveyed. 34 ref. (R1)

285-R. The Role of Peroxides in the Corrosion of Lead by Lubricating Oils. B. S. Wilson and F. H. Garner. *Journal of the Institute of Petroleum,* v. 37, May 1951, p. 225-238.

Corrosion of lead by lubricating oils undergoing oxidation at about 150° C. was studied. Methods were devised for estimation of acidity, peroxide content of the oils, and of corrosion of lead. A theory is proposed to explain the effect of atmospheric oxygen on rate of corrosion by engine oils previously oxidized for several hours in the absence of lead. (R7, Pb)

286-R. The Role of Current Distribution in Cathodic Protection. Homer D. Holler. *Journal of Research of the National Bureau of Standards,* v. 47, July 1951, p. 1-6.

Procedure for determining current distribution over an electrode surface, as required in cathodic protection or in electroplating when the electrode potential bears a known relation to current density. Relation of current distribution to resistance of current path and counter electromotive force. The primary current distribution (without polarization) is also computed. A method is suggested for determining the electrode potential-current density relation over an extensive surface in a uniform medium. (R10, P15)

287-R. Corrosion—Cause and Prevention. Rick Mansell. *Organic Finishing,* v. 12, June 1951, p. 19-21.

Theory of corrosion and prevention methods. (R1, R10)

288-R. Considerations of Current Corrosion Problems in the Pulp and Paper Industry. H. O. Teeple. *Paper Mill News,* v. 74, July 7, 1951, p. 10, 12, 14.

Emphasis on present shortages of certain metals and alloying elements. (R general, T29)

289-R. Corrosion Factors in Design. Fred M. Reinhart. *Product Engineering,* v. 22, July 1951, p. 101-107.

Methods of minimizing attack under six types of exposure: atmospheric, underwater, galvanic, concentration-cell, stress, and fretting corrosion. (R general)

290-R. Recommended Design Details to Reduce Corrosion. *Product Engineering,* v. 22, July 1951, p. 158-159.

Diagrams are briefly explained. (R general)

291-R. Corrosion Fundamentals in Field Application. Alfred Chatenever. *World Oil,* v. 133, July 1, 1951, p. 194, 196, 198, 200.

The relation of fundamental corrosion theory as developed in the research laboratory to actual field practice is clarified to show how complicated studies bring about practical mitigation programs. Chemical and electrical theories of corrosion, and a possible answer to the pitting problem is presented. (R1)

292-R. Protection of Structural Steel Against Atmospheric Corrosion. Part I. General Principles. J. C. Hudson. **Part II. Practical Applications.** W. A. John-

son. *Journal of the Iron and Steel Institute,* v. 168, June 1951, p. 165-180.

In Part I, the approach is theoretical. In Part II, ways and means are considered by which principles may be put to industrial use. The conditions which a "mass-produced" coating should fulfill, and some dependable coatings, which are assumed to be painted later in the usual way. 13 ref.
(R3, L general, CN)

293-R. Study of Selective Oxidation of Iron-Nickel Alloys by X-Ray Diffraction. (In French.) Jean Moreau and Jacques Bénard. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, May 16, 1951, p. 1842-1843.

A method for determining the variation in composition of very thin metallic layers. Composition of the metallic phase in contact with the oxide was determined for alloys containing 5, 10, 20, and 30% Ni at 850, 950, and 1050° C. (R2, Fe)

294-R. Mechanism of Corrosion Fatigue. (In Russian.) G. V. Karpenko. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 11, 1951, p. 827-830.

Results of experimental investigation. Two processes are involved: first, formation of fatigue microfissures by adsorption of a corrosive agent during cyclic loading: and second, the corrosion process itself inside cracks already formed, thus promoting their growth. Results obtained with steel. (R1, ST)

295-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 43, July 1951, p. 91A-92A.

The sigma phase in stainless steels with particular reference to corrosion by liquids. (R5, M26, SS)

296-R. Low Temperature Oxidation of Copper. II. Reaction Rate Anisotropy. T. N. Rhodin, Jr. *Journal of the American Chemical Society,* v. 73, July 1951, p. 3143-3146.

The oxidation rate of single-crystal Cu surfaces exposed to pure O_2 at temperatures from 78 to 323° K. was observed to be highest for the least densely packed (100) face and smallest for the most densely packed (111) face. The rate anistropy is adequately described by the mathematical treatment of Mott and Cabrera, although the physical significance of their assumptions is ambiguous. The reaction-rate anisotropy was also shown to be consistent with the theoretical requirements of Frank and Van der Merwe for the existence of oriented overgrowths. 22 ref. (R2, P13, Cu)

297-R. The Oxidation of Silicon at High Temperatures. Merwyn B. Brodsky and Daniel Cubicciotti. *Journal of the American Chemical Society,* v. 73, July 1951, p. 3497-3499.

Studied between 950 and 1160° C. The metal was found to oxidize very slowly even at high temperatures. An explanation of the logarithmic nature of the reaction is attempted in view of the vitreous nature of the oxide formed. 10 ref. (R2, Si)

298-R. Copper-Nickel-Iron Alloys Resistant to Sea-Water Corrosion. G. L. Bailey. *Journal of the Institute of Metals,* v. 79, July 1951, p. 243-292.

Development of Cu alloys containing 5-10% Ni and 1-2% Fe as materials easily worked by the coppersmith and resistant to corrosion by moving sea-water. The effect of small additions of Fe and Mn on resistance of a 70-30 Cu-Ni alloy to sea-water corrosion. Tests of resistance to impingement attack in moving sea-water containing air bubbles. Corrosion at shielded areas under conditions of rapid water movement. Resistance to attack under stagnant conditions. 22 ref. (R4, Cu)

299-R. Corrosion Tests With Zinc Alloy Die Castings in Damp Gypsum Plaster. L. A. J. Lodder and S. Baumgarten. *Metallurgia,* v. 43, June 1951, p. 273-279.

Occasionally cases of severely corroded Zn alloy electrical conduit fittings are reported—invariably after prolonged contact with a damp wall. Results of a search for suitable protective measures. It is recommended that a chromate treatment be adopted, and that an auxiliary coating be applied specifically to preserve the chromate coating.
(R6, L15, Zn)

300-R. Reactions in the Solid State in Oxide Films Formed on Iron. (In French.) Earl A. Gulbransen. *Revue de Métallurgie,* v. 48, May 1951, p. 337-352; disc., p. 352.

Use of electron diffraction at high temperatures. Thermodynamic calculations were made for five types of gas-solid reactions. Shows that in the solid phase, the higher oxides and Fe form FeO at 570-700° C. The formation of Fe_3O_4 and relationships between the two oxides. 29 ref.
(R2, N15, Fe)

301-R. The Effect of Copper and Iron on the Corrosion Resistance of Sheets of the Alloy $AlMg_5(Hy_5)$. (In German.) H. G. Petri and G. Siebel. *Metalloberfläche,* ser. A, v. 5, June 1951, p. A84-A93.

Tests made with 17 Al+5% Mg alloys varying in Cu content between 0 and 0.49% and in Fe content be-

tween 0.005 and 0.50%, exposed to sea water and aqueous solutions of 3% NaCl+0.1% H_2O and 3% NaCl+ 1% HCl. Results are presented in the form of tables, graphs, and photomicrographs. (R4, R5, Al)

302-R. Forms and Modes of Corrosive Attack on Aluminum Alloys. II. Effect of Rolling and Heat Treating on the Behavior of an Alloy. (In German.) Hans Kostron. *Zeitschrift für Metallkunde,* v. 42, May 1951, p. 133-137.

Rolling of an Al-Cu-Mg alloy was found to convert selective grain-boundary corrosion of the cast alloy into more diffuse or stratified corrosion, depending on degree of rolling, while intercrystalline forms of corrosion may occur in rolled and heat treated alloys. (R1, Al)

303-R. The State of Passive Iron, Especially in Nitric Acid. (In German.) Klaus J. Vetter. *Zeitschrift für Elektrochemie und angewandte Physikalische Chemie,* v. 55, May 1951, p. 274-280.

The slight corrosiveness of passive irons was studied. It was found that it is independent of Fe potential and that addition of Cl ions increases its corrosion. Results indicate that the passive layer must be devoid of active pores and that corrosion is the result of the slow solution of the passive surface. 42 ref. (R10, Fe)

304-R. H. H. Uhlig's Electron-Configuration Theory of Passivity; A Critical Evaluation. (In German.) Theo Heumann. *Zeitschrift für Elektrochemie und angewandte Physikalische Chemie,* v. 55, May 1951, p. 287-295.

Shows that, except for Ni, the known physical properties of metals and alloys indicate that the electron exchange demanded by above theory is highly improbable, that any electron exchange would be opposite to that indicated by the theory, and that in heterogeneous alloys their phase states must be considered. 37 ref. (R10)

305-R. The Battle Against Corrosion. Trevor J. Williams. *Australasian Engineer,* May 7, 1951, p. 149, 151, 153.

Corrosion has been proved to be due to the action of sulphate-reducing bacteria. These microbes have the power of converting certain salts in the soil to sulfuretted hydrogen. Various methods of cure are proposed. (R1, R8)

306-R. Some Fundamentals of Corrosion & Protection. M. A. Comley. *Electroplating and Metal Finishing,* v. 4, July 1951, p. 229.

Electrochemical corrosion, the losses caused by it, and its control. (R1)

307-R. Oxidation Resistance of High Melting Alloys. *Industrial Heating,* v. 18, July 1951, p. 1278-1280.

Reviews a paper by O. Kubaschewski and A. Schneider, presented before the British Institute of Metals. (R2, Cr)

308-R. The Mechanism of the Inhibition of the Corrosion of Iron by Solutions of Sodium Orthophosphate. M. J. Pryor and M. Cohen. *Journal of the Electrochemical Society,* v. 98, July 1951, p. 263-272.

Results of experimental study of the above in the presence and absence of air. Suggests that oxygen dissolved in solution is mainly responsible for passivity by virtue of its heterogeneous reaction with surface iron atoms to form γ-Fe_2O_3 in a similar manner to that by which oxide films are formed in air. 18 ref. (R10, Fe)

309-R. Effects of Alkaline Detergents on a Magnesium Die Casting Alloy. J. Fred Hazel and William Stericker. *Journal of the Electrochemical Society,* v. 98, July 1951, p. 273-276.

Test panels of AZ91 alloy were immersed in still and electrolytic baths of alkaline electrolytes at 90° C. Weight changes and appearance of the treated panels were noted. The metal was not attacked by sodium hydroxide, sodium orthophosphate, and the more alkaline silicates, except when it was the anode. The Mg-ion sequesterers, tetrasodium pyrophosphate, Calgon, and Quadrafos caused marked weight losses. Attack of the metal occurred in all cases where it was used as the anode. 13 ref. (R5, Mg)

310-R. The Dissolution of Magnesium in Hydrochloric Acid. B. Roald and W. Beck. *Journal of the Electrochemical Society,* v. 98, July 1951, p. 277-290.

Studied by measuring dissolution rates and electrode potentials as functions of acid concentration, rate of agitation, temperature, external polarization, alloy composition, and additions to the acid solution. The measurements offer evidence in favor of a diffusion-controlled reaction. Stirring effect of the hydrogen bubbles was evaluated. Changes in electrode potential with the acid concentration were shown to depend on deposition of low overvoltage impurities on the surface of the metal. 38 ref. (R5, Mg)

311-R. Cathodic Protection Technical Practices. *Petroleum Engineer,* v. 23, July 1951, p. D9-D12, D14, D16, D18.

Application of cathodic protection and mitigation of electrolytic cor-

rosion caused by stray current from cathodic protection systems. 56 ref. (R10)

312-R. Stove Polish Formulation. *Soap and Sanitary Chemicals,* v. 27, July 1951, p. 79, 81.

Applicability as a corrosion preventative in marine and airplane engines. (R10)

313-R. 18-8 Can Be Cured After Intergranular Attack. R. N. Gillmor. *Iron Age,* v. 168, Aug. 2, 1951, p. 81-85.

Intergranular attack of 18-8 can be cured by holding for long periods of time in the sensitizing temperature range. Cr diffusion from the unaffected areas into the impoverished grain-boundary areas, rather than dissolving the precipitated Cr carbides, apparently causes the cure. Includes photomicrographs. (R2, N1, SS)

314-R. Prediction of Corrosion in Oil and Gas Wells. D. A. Shock and J. D. Sudbury. *Petroleum Engineer,* v. 23, July 15, 1951, p. B86, B88, B90, B92, B94, B96; disc., p. B98.

Using techniques and fundamental data developed by corrosion studies in high-pressure condensate wells, the prediction techniques and evaluation methods were extended to oil-well corrosion. Internal corrosion in both oil and gas wells is believed to be due to acidity developed in the water phase. The acids found and an evaluation of their corrosive behavior; variable factors influencing corrosion rates; utility and limitations of the various prediction schemes. 18 ref. (R11, ST)

315-R. Corrosion-Prevention in a TCC Gas Plant. C. A. Murray and M. A. Furth. *Petroleum Engineer,* v. 23, July 15, 1951, p. C3, C5-C8.

Corrosion-control measures for the gas plant of a modern catalytic-cracking unit. Inspection and laboratory data were used to assess the degree and nature of corrosion. No matter where corrosion occurred, it was found to be almost entirely associated with excessive water present in the system. A corrosion-control program was put into effect that consisted, for the most part, of water-removal measures at key points. (R10, ST)

316-R. Plant Stops Return Line Corrosion—Saves $14,200 a Year. Erle Elliott and Philip J. Gaughan. *Power Engineering,* v. 55, Aug. 1951, p. 104, 106-107, 109.

Results of a method on filming amines to prevent corrosion used at Glen L. Martin Co. (R10, Fe)

317-R. Corrosion of Cars Costs $191 Million a Year—How Can It Be Reduced? *Railway Age,* v. 131, Aug. 6, 1951, p. 65-69.

Typical kinds of corrosion in railway equipment and techniques in design as a means of reducing corrosion damage. (R general, T22, ST)

318-R. Nylon—A Factor in Stress Corrosion of Aluminum Bronze. E. J. Silk. *Journal of Metals,* v. 3, Aug. 1951, p. 600.

Stress-corrosion cracking occurred in a clamp ring of Al bronze in contact with a nylon gear. In view of definite evidence of a stress-corrosion failure and the fact that the Al bronze was metallurgically free of defects, it was concluded that the nylon gear was the contributing factor to the failure. (R1, Cu)

319-R. Fighting Corrosion. Marshall E. Parker. *Industry and Power,* v. 61, July 1951, p. 97-99.

Procedures recommended for protection of pipelines and other buried structures. (R8, R10, Fe)

320-R. Corrosion and Scaling Problems in Piping for Radiant Heating. Richard B. Conlan. *Industry and Power,* v. 61, Aug. 1951, p. 68-69.

Causes of failure and preventive measures. Use of inhibitors is emphasized. (R10, Fe)

321-R. Ocean Test Tube Gets New Extension. *Industry and Power,* v. 61, Aug. 1951, p. 78-79.

Corrosion and fouling test station of International Nickel Co., formerly at Kure Beach, N. C., now rebuilt at Harbor Island, N. C. (R11)

322-R. The Nature and Use of Petroleum Base Rust Preventives. H. B. Carpenter. *Lubrication Engineering,* v. 7, Aug. 1951, p. 174-177.

The four principal types are plastic, fluid, thin-film, and solvent. Various typical uses are discussed. Application and removal. (R26)

323-R. Mercury Boiler Treatment With Titanium and Magnesium Metals. Richard C. Reid. *American Society of Mechanical Engineers,* Paper 51-S-13, 1951, 8 pages.

The action of Ti and Mg metal dissolved in the mercury in protecting boiler steel from attack by Hg. This treatment also produces stable wetting of the boiler surfaces, thus maintaining adequate heat transfer. Phase diagrams of the various metallic systems present, and their behavior at the temperatures encountered. Effects of O_2 with particular attention to air infiltration and its effects on Hg treatment. (R10, M24, Hg, Ti, Mg, ST)

324-R. Report of Committee A-5 on Corrosion of Iron and Steel. T. R. Gal-

loway, chairman. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 100-117.

Previously abstracted from *American Society for Testing Materials,* Preprint 3, 1950. See item 256-R, 1950. (R general, S22, Fe, ST)

325-R. Report of Committee B-6 on Die-Cast Metals and Alloys. J. R. Townsend, chairman. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 167-172.

Previously abstracted from *American Society for Testing Materials,* Preprint 12, 1950. See item 257-R, 1950. (R3, Q general Al, Mg, Zn)

326-R. Spray Testing With Natural and Synthetic Sea Water. Part I. Corrosion Characteristics in the Testing Metals. Thomas P. May and Allen L. Alexander. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1131-1141; disc., p. 1142-1143.

A formula is proposed for a solution which duplicates the inorganic components of natural ocean waters. Comparative tests were conducted in spray cabinets using 3% and 20% NaCl, natural ocean water, and the proposed solution. At the same time corrosion tests were conducted in natural environments. These tests reveal little similarity of performance between the natural environments and the spray cabinets using NaCl solution. The only exception exists in the deterioration of Ni-plated steel. In tests with ingot Fe and plain steels, spray tests with natural and synthetic sea waters did not duplicate the types of corrosion usually observed in natural marine environments. ZnO plated steel and solid Zn sheet corrode in a similar manner in synthetic and natural environments. (R11, Fe, CN, Zn, Ni)

327—R. Spray Testing With Natural and Synthetic Sea Water. Part II. A Study of Organic Coatings. Allen L. Alexander and Thomas P. May. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1144-1149; disc., p. 1150.

Previously abstracted from *American Society for Testing Materials.* Preprint 26, 1950. See item 258-R, 1950. (R11, L26, Fe)

328-R. Impact Deposition of Atmospheric Sea Salts on a Test Plate. Alfred H. Woodcock. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1151-1160; disc., p. 1161-1166.

Rusting of structural steels at Block Island, R. I., and at Kure Beach, N. C., has been attributed in major part to the presence of chlorides on the test plates. Indicates the weight and the number of sea-salt nuclei which were deposited on surfaces by impact during the passage of marine winds in the Block Island region. Suggests that impact deposition may largely account for the presence of chlorides on these plates. (R11, CN)

329-R. Effectiveness of Ceramic Coatings in Reducing Corrosion of Five Heat-Resistant Alloys by Lead-Bromide Vapors. Dwight G. Moore and Mary A. Mason. *National Advisory Committee for Aeronautics,* Technical Note 2380, June 1951, 27 pages.

Tests on five heat-resistant alloys. The specimens in an uncoated condition, in a preoxidized condition, and with three different ceramic coatings, were exposed for 6 hr. to $PbBr_2$ vapors in an air atmosphere at temperatures of 1350, 1500, and 1650° F. 10 ref. (R9)

330-R. Advances in Copper and Its Alloys. Part II. John R. Freeman, Jr. *Canadian Metals,* v. 14, July 1951, p. 12, 14.

Engineering alloys, stress-corrosion cracking, and research on quality testing. (R1, S13, Cu)

331-R. Action of Dilute Sulphuric Acid on Magnetized Iron. G. Wagner and F. Blaha. *Nature,* v. 168, July 14, 1951, p. 74.

It has been stated that in addition to H_2, O_2 is evolved in considerable quantities in above reaction whereas with unmagnetized Fe no such phenomenon occurs. Results obtained using spectroscopically pure Fe show that this difference is apparently nonexistent. (R5, Fe)

332-R. Corrosion Tests on Tin-Nickel. S. C. Britton and R. M. Angles. *Metal Industry,* v. 79, July 20, 1951, p. 46-50.

Summarized from a paper presented before the London Centre of the Electrodepositors' Technical Society. Results of a series of tests on an electrodeposited alloy containing 65% Sn and 35% Ni. (R11, Sn)

333-R. Scaling of Gas-Turbine Alloys. A. Preece. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 149-152.

The problem of high-temperature oxidation in the gas turbine, with special reference to the products of combustion of the fuel and impurities which may be present in the fuel. 24 ref. (R2, T25, SG-h, AY)

334-R. Scaling of Heat-Resisting Steels; Influence of Combustible Sulphur and Oil-Fuel Ash Constituents. C. Sykes and H. T. Shirley. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 153-169.

Examines the effect of combustible sulfur and of potentially dangerous ash constituents on the behavior of a range of typical gas-turbine steels under varying air-fuel ratios. Consideration is also given to the effect of molybdenum oxide, in view of the molybdenum content of some of the steels.
(R2, T25, SG-h, AY)

335-R. Periodic Phenomena in Vapor Attack on Metals. Application to Determination of Corrosion Rate. (In French.) Rene Dubrisay and Francois Arlet. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 267-270.

Previously abstracted from *Bulletin de la Société Chimique de France.* See item 275-R, 1951.
(R9, Ag, Cu)

336-R. A New Instrument for Measuring Electrolytic Corrosion Currents. (In French.) H. P. Godard. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 276-282.

Factors influencing electrolytic corrosion; experiments and measurements with new instrument; and applications (R11)

337-R. Determination by Interference Coloration or by Polarized Light of the Oxidation-Rate of Certain Faces of a Copper Monocrystal. (In French.) Allan T. Gwalthmey and Frederick W. Young. *Revue de Métallurgie,* v. 48, June 1951, p. 434-440.

Presents an experimental method. Results confirm the principle that rate of oxidation depends for the most part on type of crystalline face which makes up the exposed surface. Greatest source of error in the experiments lies in preparation of surface, which must be smooth and not cold worked. 10 ref.
(R2, M26, Cu)

338-R. The Potential of the Iron Electrode. (In German.) J. D'Ans and W. Breckheimer. *Naturwissenschaften,* v. 38, 2nd June no., 1951, p. 282.

Experimental results indicate that they influence current concepts of Fe corrosion. (R1, Fe)

339-R. Theory of Oxidation of Metals and Metallic Alloys. (In German.) K. Hauffe. *Werkstoffe und Korrosion,* v. 2, June 1951, p. 221-231; July 1951, p. 243-249.

Formation of thin layers of tarnish on pure metals at lower temperatures, where oxide films cease to become thicker, is explained by electron-energy-level theory. Hole-formation theory explains sealing of metal alloys with ion conducting layers, and scaling systems with excess and deficit electron conducting layers. Effect of phase boundary reactions during oxidation and growth of protective layers, theory of "internal oxidation" of metal alloys, and possibility of developing scale-resistant metallic alloys. 41 ref. (R2)

340-R. The Corrosive Properties of Automobile Transmission Oils. (In German.) A. Bukowiecki. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, June 1951, p. 182-191.

Nine samples of oils with and without Cl were tested for corrosive action on Fe and Cu. Oils heated to 80-120° C. were found to have little effect on Fe even after extended contact, except that chlorinated oil showed distinct "after-rusting" effect on Fe, i.e., Fe removed from oil had an increased tendency to rust when stored in humid atmosphere. All oils strongly attacked Cu at 122° C. 28 ref.
(R7, Fe, Cu)

341-R. The Behavior of Copper-Containing Aluminum in Common Salt Solutions. (In German.) Doris Kuhlmann-Wilsdorf and Georg Masing. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 497-503.

Corrosion tests on Al alloys with 0-6.64% Cu, annealed and quenched from 500° C., in buffered NaCl solutions, show that stationary potential of the alloys increases in nobility with the Cu content of the solid solutions and that Cu, after dissolving with solid solutions, precipitates again. (R5, Cu, Al)

342-R. Methods of High Temperature Oxidation Testing and Evaluation of Observations. Carl Wagner. *American Society for Metals,* "High Temperature Properties of Metals," 1951, p. 93-132.

Reviews test methods, and includes fundamental mechanisms of oxidation of metals and alloys. 89 ref.
(R2)

343-R. Corrosion Tests and Service Performance. F. L. LaQue. *American Society for Metals,* "Interpretations of Tests and Correlation With Service," 1951, p. 141-192.

Laboratory and field-test procedures. Effects of various factors. Typical results and conclusions.
(R11)

344-R. Deformation and Corrosion; Recent Russian Work on the Corrosion of Metals. *Chemical Age,* v. 65, Aug. 4, 1951, p. 153-155, 158. (Based on paper by E. M. Zaretskii, *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry, v. 24, May 1951, p. 477-484.)

Reviews some of the general ideas and factors involved in corrosion as affected by deformation, and tests with various Mg alloys, steel, Cu, Zn, and Al, exposed to various forms of deformation and to different corrosion media. 13 ref. (R11)

345-R. The Corrosion Forum. Materials of Construction vs. Phenol. *Chemical Engineering,* v. 58, Aug. 1951, p. 222, 224, 226, 228.

Contains the following articles: "Nickel and Nickel Alloys," W. Z. Friend; "Carbon and Graphite," J. F. Revilock; "Worthite," W. E. Pratt; "Hastelloy," E. D. Weisert; "High-Silicon Irons," Walter A. Luce; "Durimet," Walter A. Luce; "Aluminum," W. W. Binger and R. H. Brown; "Chlorimets," Walter A. Luce; "Glass Lining," S. W. McCann; "Coatings," Kenneth Tator; "Stainless Steel," Grant L. Snair, Jr.; "Silicones," J. A. McHard and Leon Van Valkinburg; "Cements," Raymond B. Seymour; "Iron and Steel," Albert W. Spitz; "Tantalum," Leonard R. Scribner; "Rubber Lining," J. P. McNamee; and "Lead," Kempton H. Roll. (R7)

346-R. Objectives of TP-16; Electrolysis and Corrosion of Cable Sheaths. Irwin C. Dietze. *Corrosion* (Technical Section), v. 7, Aug. 1951, p. 253-255.

Scope of work and organization of above NACE Committee. Lists members. (R general, T1)

347-R. High Pressure Sweet Oil Well Corrosion. H. L. Bilhartz. *Corrosion* (Technical Section), v. 7, Aug. 1951, p. 256-264.

Results of statistical studies conducted under the auspices of an NACE committee, as well as basic data established during individual company investigations. General pitting-type corrosion resulting from CO_2, organic acids and possibly other unidentified corrosive agents occurs frequently in wells producing pipeline oil. The attack continues after wells begin producing water. Pitting frequency varies with deviations in wall thickness of the tubing. Maximum concentration occurs at points of minimum wall thickness. Possible remedies and economic analysis. (R2, ST)

348-R. Corrosion Studies of Iron in the Presence of Sulfur. Raymond B. Seymour, Walter R. Pascoe, and R. D. Stout. *Corrosion* (Technical Section), v. 7, Aug. 1951, p. 265-268.

Purpose of study was to determine the effects of various additives both in sulfur cement and in the surrounding aqueous solution when an interface of iron and sulfur is present in contact with water. No corrosion was observed when the iron was protected by even thin layers of sulfur cement. Historical evidence and results of this investigation indicate that properly prepared sulfur cement joints are satisfactory in bell and spigot cast-iron water mains. A sulfur cement plasticized with Thiokol has been used as a jointing material for brick in acid pickling tanks. 12 ref. (R5, Fe)

349-R. Control of Corrosion Damage to Rolling Stock Through Proper Design and Maintenance. F. K. Mitchell. *Corrosion* (Technical Section), v. 7, Aug. 1951, p. 269-275.

A study was made of the ratio of maintenance cost on passenger and freight cars attributable to corrosion damage and the cost of repairs resulting from corrosion damages to that resulting from other causes. This ranged from 8% for flat cars to 64% for hopper cars. Typical types of corrosion are illustrated. (R3, T23, ST)

350-R. Stainless Steels for the Bottoms of Tanks Containing Sour Crude Oil. C. P. Larrabee and W. F. Rogers. *Corrosion* (Technical Section), v. 7, Aug. 1951, p. 276-278.

Results of tests made for 6 months and 1 year under conditions similar to those existing in practice indicate that austenitic stainless steels have a satisfactory resistance to corrosion and thus are suitable as constructional materials for the bottoms of sour-crude-oil storage tanks. (R7, T29, SS)

351-R. Materials of Construction for Handling Sulfuric Acid; TP-5A—Materials, Handling and Manufacturing Sulfuric Acid. Spencer W. Shepard. *Corrosion* (Technical Section), v. 7, Aug. 1951, p. 279-282.

Information on a wide variety of ferrous and nonferrous materials for handling H_2SO_4. (R5, T29)

352-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 43, Aug. 1951, p. 65A-66A, 68A.

Summarizes corrosion data on chart form. Presents temperatures and concentrations for corrosion of steel by sulfuric acid. (To be continued.) (R5, ST)

353-R. Examination of Aluminium Mudguards from Lanchester Motor Car Built in 1903. G. J. Metcalfe. *Light Metals,* v. 14, Aug. 1951, p. 469.

From the metallurgist's point of view the most interesting observations are: the generally sound condition of the material; the absence of corrosion around rivet holes where copper rivets had been used; the comparatively small amount of corrosion of the Al where it came into direct contact with iron brackets; the successful use of a lead-containing primer paint, which is contrary to recommended modern practice; and the excellent adhesion of the paint to the aluminium in spite of the surface having only been shot blasted prior to application. (R general, L26, Al)

354-R. Easily Made Test Probe for Hydrogen Attack. *Petroleum Processing,* v. 6, Aug. 1951, p. 877, 879.

Similar to a thermowell, the probe is installed in suspect areas and measures the rate of H_2 penetration through a thin wall, or membrane, of steel, to indicate the extent of H_2 activity in the particular environment under test. (R9, ST)

355-R. Formation of Oxides on Some Stainless Steels at High Temperatures. H. M. McCullough, M. G. Fontana, and F. H. Beck. *Transactions of American Society for Metals,* v. 43, 1951, p. 404-420; disc., p. 420-425.

Previously abstracted from *American Society for Metals,* Preprint 4, 1950. See item 406-R, 1950. (R2, SS)

356-R. The Oxidation of Pure Iron. J. K. Stanley, J. von Hoene, and R. T. Huntoon. *Transactions of American Society for Metals,* v. 43, 1951, p. 426-446; disc., p. 446-453.

Previously abstracted from *American Society for Metals,* Preprint 5, 1950. See item 407-R, 1950. (R2, Fe)

357-R. Water Boiler. C. P. Baker, H. K. Daghlian, G. Friedlander, M. G. Holloway, D. W. Kerst, and R. E. Schreiber. *U. S. Atomic Energy Commission,* AECD-3063, Sept. 4, 1944, 32 pages.

Structural features of the uranyl sulfate "water boiler" (a homogeneous chain-reacting pile). Safety features. Results of corrosion tests on stainless steel of which the sphere is made, and fabrication of the BeO tamper surrounding the sphere. Structure and function of the control rod and the safety rod, with their related mechanical systems. Temperature control system. (R general, SS)

358-R. Certain Aspects of Internal Corrosion in Tin Plate Containers. R. R. Hartwell. "Advances in Food Research, Vol. III" (Academic Press, New York), 1951, p. 327-383.

Manufacture of tin plate, mechanism of corrosion, corrosion characteristics of food and their components, effects of the trace elements S and Cu, effects of weight and porosity of the Sn coating, effects of the steel base, tin plate testing, enameled cans, and elctrolytic tin plate. 42 ref. (R5, L17, Sn, ST)

359-R. Intergranular Corrosion of Austenitic Stainless Steels. (In French.) Louis Colombier and Joseph Hochmann. *Comptes Rendus hebdomadaries des Séances de l'Académie des Sciences,* v. 233, July 9, 1951, p. 176-178.

Intergranular corrosion is explained as due to chromium carbide precipitation in the grain boundaries, with Cr impoverishment in the adjoining zone, which thus becomes attackable. (R2, SS)

360-R. Study of Valve Technique for Aviation, Automobile, and Diesel Motors. (In French.) A. Balleret. *Métaux: Corrosion Industries,* v. 26, June 1951, p. 256-268.

Steels, special alloys, and processes for increasing stability at high temperatures, and for avoiding wear and corrosion were studied. (R2, T7, ST, SG-g, h)

361-R. Protection of Ferrous Surfaces Against Corrosion. (In Italian.) Erica Antinori. *Tecnica Italiana,* v. 6, Mar.-Apr. 1951, p. 120-126.

Corrosion experiments done in the FIAT Laboratories in Turin, Italy. New method of corrosion protection. (R11, R10, Fe)

362-R. Mechanism of Protection of Iron From Corrosion by Sodium Nitrate. (In Russian.) I. L. Rozenfel'd. *Doklady Akademii Nauk SSSR* (Reports of the Sciences of USSR), new ser., v. 78, May 21, 1951, p. 523-526.

Two graphs show the experimentally determined influence of additions of $NaNO_3$ to the electrolyte on cathodic and anodic polarization of iron. Different curves show current density vs. emf. for a series of concentrations from 0 to 5.0 g. $NaNO_3$ per liter of an alkaline solution, pH = 9. (R10, Fe)

363-R. Coal-Ash Corrosion of Metals at Elevated Temperatures. C. T. Evans, Jr. *American Society for Testing Materials,* "Symposium on Corrosion of Materials at Elevated Temperatures", 1951, p. 3-8; disc., p. 9-10.

Previously abstracted from *American Society for Testing Materials,* Preprint 55, 1950. See item 259-R, 1950. (R7, AY, SG-h)

364-R. Stress-Corrosion Tests on Turbo-Supercharger Materials in the Products of Combustion of Leaded Gasoline. G. B. Wilkes, Jr. *American Society for Testing Materials,* "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 11-23; disc., p. 24-25.

Previously abstracted from *American Society for Testing Materials,* Preprint 60, 1950. See item 260-R, 1950. (R1, SG-h)

365-R. Preliminary Studies of the Effect of Oxidizing Sulfurous Atmospheres on the Rupture Strength of Inconel "X" and Inconel. A. M. Talbot and E. N. Skinner. *American Society for Testing Materials,* "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 42-48; disc. p. 49.

Results of investigation. Effects on surface microstructures. (R2, Q23, Ni)

366-R. Oil Ash Corrosion of Materials at Elevated Temperatures. C. T. Evans Jr. *American Society for Testing Materials,* "Symposium on Corrosion of Materials at Elevated Temperatures," 1951, p. 59-105; disc., p. 106-113.

Comprehensive investigation for a wide variety of oil-ash compositions and for nine representative stainless steels and other high-temperature alloys, at several temperatures between 1000 and 1500° F. Value of several protective coatings of ceramic, diffusion, or metallizing types. 38 ref. (R7, L general, SS, SG-h)

367-R. VPI Joins Fight Against Rust. Scott H. Heiniger. *Aviation Week,* v. 55, Sept. 10, 1951, p. 48-49.

A volatile powder called VPI 260 that produces corrosion-inhibiting vapors. It is used as a standard preservative by several airlines for protection of engines and components in storage and equipment. Its active ingredient is dicyclohexylammonium nitrite. (R10)

368-R. Deformation & Corrosion. Part II. Aluminium, Zinc, Copper & Steel. *Chemical Age,* v. 65, Sept. 1, 1951, p. 299-300. (Based on paper by E. M. Zaretskii, *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 24, May 1951, p. 477-484).

Experiments on effects of deforming stresses on corrosion of above materials in different media. (R general, Q24, Al, Zn, Cu, ST)

369-R. The Corrosion Situation: Past, Present, and Future. U. R. Evans. *Chemistry & Industry,* Aug. 25, 1951, p. 706-711.

Five examples of successful attack on corrosion problems: corrosion of marine condenser tubes; prevention of oxidation and tarnishing; protection of steel from corrosion by metal spraying; use of Zn-rich paints; and bronze disease, a type of intense corrosion which attacks bronze figures or other castings of beauty and value, which have survived 2000 years or more without serious corrosion. (R general, L23, L26)

370-R. Dynamically Testing Corrosion in Cooling Water Systems. Ralph D. Miller. *Corrosion* (News Section), v. 7, 1951, p. 1.

A dynamic tester developed to provide a quick means of determining the effect of inhibitors in cooling water containing various concentrations of contaminants. The amount of corrosion or scaling can be easily tested. Applicable to any metal or alloy. (R11)

371-R. Dicyclohexylammonium Nitrite, A Volatile Inhibitor for Corrosion Preventive Packaging. A. Wachter, T. Skei, and N. Stillman. *Corrosion,* (Technical Section), v. 7, Sept. 1951, p. 284-294.

Dicyclohexylammonium nitrite is a powerful inhibitor for corrosion of steel by fresh water. Since this nitrate salt is slightly volatile, it has commercial application in a new method for preventing corrosion of packaged steel articles by the moisture that enters or is present within a package. Tests are reported on SAE 1020 steel. (R10, ST)

372-R. Stress Corrosion Cracking in Alkaline Solutions; Technical Practices Committee 5 C—Sub-Surface Corrosion by Alkaline Solutions. H. W. Schmidt, P. J. Gegner, G. Heinemann, C. F. Pogacar and E. H. Wyche. *Corrosion* (Technical Section), v. 7, Sept. 1951, p. 295-302.

Results of an industry survey of the failure of materials in alkaline solutions. Most of the data have to do with NaOH. The relationship of temperature and concentration to failure can be expressed only in an approximate manner. Corrective measures used to eliminate failure. (R1, R5)

373-R. Corrosion Problems of Motor Coaches. K. L. Raymond. *Corrosion* (Technical Section), v. 7, Sept. 1951, p. 303-307; disc., p. 307.

Merits of various preventive measures. (R10, R3)

374-R. Corrosion Problems in Rural Power Distribution. Orville W. Zastrow. *Corrosion* (Technical Section), v. 7, Sept. 1951, p. 308-311, disc., p. 311.

Mitigative measures being applied or considered. (R3)

375-R. Prevention of Corrosion and Metal Attack in the Steam Water Cycle of the Steam Power Plant. Frederick G. Straub, and Harry D. Ongman. *Corrosion* (Technical Section), v. 7, Sept. 1951, p. 312-315; disc., p. 315.

Potential sources of Fe and Cu solubility in the preboiler cycle and effect of these metals on the steel in the boiler. Results of studies conducted to determine the effect of pH in the cycle on the solubility of these metals. Action of reducing chemicals in the boiler beyond their normal action on free oxygen. (R4, ST)

376-R. Fundamental Researches on Corrosion. U. R. Evans. *Journal of the American Society of Naval Engineers,* v. 63, Aug. 1951, p. 646-650.

Previously abstracted from original in *Engineering.* See item 188-R, 1951. (R general, L general)

377-R. The Kinetics of the Reaction of Germanium and Oxygen. Richard B. Bernstein and Daniel Cubicciotti. *Journal of American Chemical Society,* v. 73, Sept. 1951, p. 4112-4114.

The rate of oxidation of Ge was measured in the range of 575 to 705° C. The kinetics do not conform to any of the previously observed rate laws for metal oxidations. A mechanism is proposed in which oxidation rate is controlled by the rate of evaporation of GeO. This rate of evaporation is in turn governed by the extent to which the surface is covered by impervious GeO_2. (R2, P13, Ge)

378-R. The Difference Effect on Titanium Dissolving in Hydrofluoric Acid. M. E. Straumanis and P. C. Chen. *Journal of the Electrochemical Society,* v. 98, Sept. 1951, p. 351-355.

The difference effect was determined during the dissolution of commercial Ti coupled with Pt in 0.1, 0.24, 0.5, 1.0, and 2N HF. This effect was directly proportional to the galvanic current up to 40 or 60 ma. per sq. cm., being nearly independent of concentration of the acid. It enables determination of degree of polarization of local elements formed on different metals. 13 ref. (R1, Ti)

379-R. Electrolytic Probe for Underground Corrosion Studies. W. Beck. *Journal of Metals,* v. 3, Sept. 1951, p. 706-711.

How the electrolytic probe technique is applied to determine the density of corrosive currents on buried metallic structures. The probe consists of a hollow half cylinder, placed on the outside surface of a line, connected to the installation through a current meter of low internal resistance. 11 ref. (R8)

380-R. Potential and Current Requirements for the Cathodic Protection of Steel in Soils. W. J. Schwerdtfeger and O. N. McDorman. *Journal of Research of the National Bureau of Standards,* v. 47, Aug. 1951, p. 104-112.

Potentials of steel in 20 air-free soils varying in pH from 2.9 to 9.6 were determined. These data and the potential-pH relation for the hydrogen electrode were used in fixing the optimum potential for the cathodic protection of the steel against corrosion. 15 ref. (R10, ST)

381-R. The Corrosion-Resistance of Stainless Steels Towards Citrus Fruit-Squash Concentrates and Towards Citric Acid-Sugar-Common Salt-Sulphur Dioxide Solutions. J. M. Bryan and J. W. Selby. *Journal of the Science of Food and Agriculture,* v. 2, Aug. 1951, p. 359-364.

Results of experiments show that stainless steels containing 2-3% Mo have a markedly greater resistance to corrosion by above solutions in general. Welding tends to lower the corrosion resistance of the Mo-bearing stainless steels to citrus-fruit concentrates. (R7, SS)

382-R. Duplex Tubing for Use in the Petroleum Industry. C. L. Bulow. *Petroleum Engineer,* v. 23, Sept. 1951, p. C5-C8.

In the petroleum industry, heat-exchanger and condenser are often attacked simultaneously inside and outside by two entirely different types of corrosive media. Duplex tubing to solve these problems is made by sliding one seamless tube inside the other and then drawing the tubes together to obtain a tight friction grip or mechanical bond between them. Various metal combinations, their specific applications, and corrosion resistances of the alloys involved to different media. (R7, T29)

383-R. The Rational Approach to Cathodic Protection. Marshall E. Parker. *Petroleum Engineer,* v. 23, Sept. 1951, p. D14, D16, D18.

Pros and cons from the practical viewpoint. Details of three cases to answer the management question: "Will it pay in *this* case?" (R10)

384-R. A Spectrophotometric Study of the Oxidation of Tantalum. J. T. Waber, G. E. Sturdy, E. M. Wise, and C. R. Tipton, Jr. *U. S. Atomic Energy Commission,* AECU-1355, Mar. 23, 1951, 44 pages.

The air oxidation of Ta was studied by newly developed spectrophotometric and microgravimetric methods between 220 and 350° C. Results show that the resistance of Ta to oxidation and to thermal cycling of the oxide-covered metal is excellent up to 320° C. Highly adherent scales were formed despite frequent heating and cooling. Comparison of the results obtained by the two methods reveals good agreement. An estimate of the ratio of true to apparent surface area can be made from these data. 30 ref. (R2, Ta)

385-R. Corrosion of Cement-Bonded Sewer Pipes by Acid and Alkaline Solutions. Harvey F. Ludwig and Russell G. Ludwig. *Water & Sewage Works,* v. 98, Sept. 1951, p. 404-407.

Experiments were carried out by subjecting concrete and cement-asbestos pipe to a variety of agents. Data on amount of corrosion as related to time of exposure are graphed. (R5)

386-R. External Corrosion of Gas and Oil Well Casings. C. I. Sims. *World Oil,* v. 133, Sept. 1951, p. 262, 264-265.

The corrosion hazard in surface casing strings, and how they may

be protected by insulation of flow lines to eliminate the flow of stray currents into the unprotected casing. A survey of gas line tied in on six wells indicated current fluctuation in intensity and direction, emphasizing the danger of serious metal loss at hot spots in the system. (R7, ST)

387-R. Statistical Study of Resistance to Corrosion in Acid Copper Sulfate of Steel Containing 18% Chromium and 8% Nickel. (In French.) J. Bleton, J. Blanot, and P. Bastien. *Revue de Métallurgie,* v. 48, July 1951, p. 525-536; disc., p. 536.

Data and experimental results. (R6, SS)

388-R. New Trends in the Study of Corrosion of Metals in Me/MeX/X Systems by Means of Electric Effects in a Magnetic Field. (In Italian.) Ugo Croatto. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 1-7.

Determination of chemical and electrochemical nature of corrosion mechanism, as well as electrochemical corrosion constant, by measuring electric and Hall effect in a magnetic field. The Pb/PbS/S system is used as an example of above type of system. (R11, Pb)

389-R. Some Applications of Electrochemical Thermodynamics. (In French.) Marcel Pourbaix. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 8-24.

Behavior of Fe in aqueous solutions, considering electrochemical phenomena which occur on a metallic surface. 16 ref. (R5, Fe)

390-R. Surface Conditions and the Corrosion of Metals. (In French.) P. A. Jacquet. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 25-47.

Characteristics of metal surfaces polished mechanically and electrolytically are compared. Value of latter method for corrosion studies. Experiments were made chiefly with Cu and Al. 42 ref. (R11, Cu, Al)

391-R. Isotopic Changes and Corrosion. (In Italian.) N. Haissinsky. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 53-59.

A radioactive indicator was used to make a series of measurements on Pb, Bi, Mn, Cu, Au, Cr, Sb, Te and La to determine influence of various factors on kinetics of corrosion. 10 ref.
(R11, Pb, Be, Mn, Cu, Au, Cr, Sb, Te, La)

392-R. Influnece of the Anion in Humid Atmosphere Corrosion of Metals. (In Italian.) Roberto Piontelli. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 60-73.

22 references.
(R3, Fe, Ni, Co, Cr, Mo, W)

393-R. Experiments on the Electrical Transport of Ions in the Interior of Metals. (In French.) Giuseppe Bianchi. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 74-80.

Experiments were made with Cu-Zn, Cu-Sn, Cu-Pb, Cu-Hg, Fe-Zn and Fe-Al. Results and an explanation of the phenomenon. 21 ref.
(R1, P15, Cu, Zn, Sn, Pb, Hg, Fe, Al)

394-R. Corrosion of Cast Iron in Sulphuric, Nitric, and Hydrochloric Acid, and in Caustic Soda. (In Italian.) A Rege and V. Riva. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 81-100.

Review article. 16 ref. (R5, CI)

395-R. Research on Stainless Steels. Electrochemical and Weight-Loss Measurement in the Evaluation of Corrosion Resistance of Some Types of Stainless Steel. (In Italian.) Leo Cavallaro and Antonio Ferri. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 101-121.

A new method. 19 ref. (R11, SS)

396-R. Electrochemical Method for Testing the Protective Value of Varnishes and Anticorrosive Paint. (In Italian.) L. Cavallaro and C. Bighi. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 122-126.

Electrolytic method. (R11, L26)

397-R. Gasometric, Electrochemical, and Weight Measurement of Anodic Oxidation Films on Aluminum. (In Italian.) L. Cavallaro and G. Bolognesi. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 127-135.

Advantages of an electrochemical method which indicates variations in physical characteristics of the anodic film. (R11, A1)

398-R. Protection of Stainless and Ordinary Steels With Chromates in Corrosive, Acid, and Saline Media. (In Italian.) L. Cavallaro and A. Tani. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 136-143.

Mechanism of protection and its dependence on type of steel and pH of corrosive medium.
(R5, L14, ST, SS)

399-R. Dipolar Structure and Protective Capacity of Rust Inhibitive Oils. (In Italian.) L. Cavallaro and A. Indelli. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 144-147.

Protective properties of various mixtures were investigated. Emphasizes particularly the strong relationship existing between protection obtained, the dipolar components of oil, and role of metallic surface treated. 15 ref. (R10)

400-R. Micrographic Methods for Obtaining Corrosion Patterns on Silicon-Iron Alloys. (In Italian.) Adolfo Antonioli. *Associazione Italiana di Metallurgia,* "Corrosion Proceedings." Vol. I, 1948, p. 156-167.

Methods and results.
(R11, M21, Fe)

401-R. (Book) **Symposium on Corrosion of Materials at Elevated Temperatures.** 121 pages. 1951. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. (Special Technical Publication 108.) $2.25.

Introduction by C. T. Evans, Jr., plus eight papers and accompanying discussion. Individual papers are abstracted separately.
(R general, SG-h)

402-R. Sulphur vs. Construction. James R. West. *Chemical Engineering,* v. 58, Sept. 1951, p. 276, 278, 280-284, 286-288, 290.

A revised article which appeared originally in the Oct. 1946 issue. The major change is a completely rewritten section on stainless steel. This is followed by short articles by other authors: "Worthite", W. E. Pratt; "Chlorimets", Walter A. Luce; "Carbon and Graphite", R. O. Joslyn; "Cements", Raymond B. Seymour; "Coatings", Kenneth Tator; "Durimet 20", Walter A. Luce; "High-Silicon Irons", Walter A. Luce; "Glass Lining", S. W. McCann; "Rubber", J. P. McNamee; "Silicones", J. A. McHard and J. T. McIntyre; "Tantalum" Leonard R. Scribner.
(R6, T29)

403-R. Ceramic Coatings Prevent Exhaust Gas Corrosion. *Corrosion* (New Section), v. 7, 1951, p. 6-7.

Previously abstracted from paper by Dwight G. Moore and Mary A. Mason, *National Advisory Committee for Aeronautics,* Technical Note 2380. See item 329-R, 1951. (R9)

404-R. The Effect of Phosphorus on the Corrosion-Resistance of Magnesium and Some of its Alloys. E. F. Emley, A. C. Jessup, and W. F. Higgins. *Journal of the Institute of Metals,* v. 19, Sept. 1951, p. 23-32.

Corrosion tests were carried out, by total immersion in salt solution, on Mg alloys containing various amounts of phosphorus and other impurities. Corrosion resistance of pure Mg is reduced by the presence of P in amounts over about 0.002%, but this effect can be suppressed by addition of Mn. With a normal Fe content, the adverse effect of P is not suppressed by Mn. Corrosion resistance of high-purity Elektron A8 (Al 8, Zn 0.4, Mn 0.25%, remainder Mg) is also adversely-affected by P. Phosphorus is precipitated from Mg by Zr, and the corrosion resistance of alloys containing Zr is unaffected by P present in the metal used for their preparation.
(R general, Mg)

405-R. Effect of Alloying Elements on Corrosion Resistance of Casting Alloys. D. C. G. Lees. *Light Metals,* v. 14, Sept. 1951, p. 494-502.

Summarizes recent investigations. Comparison between Al alloys with Si, Mg, and Cu under natural atmospheric conditions. 10 ref. (R3, Al)

406-R. A Medium for the Study of the Bacterial Oxidation of Ferrous Iron. William W. Leathen, Lois D. McIntyre, and S. A. Braley, Sr. *Science,* v. 114, Sept. 14, 1951, p. 280-281.

Composition compares favorably with the major chemical composition of acid mine effluents. (R1)

407-R. The Formation of Sigma and Its Influence on the Behavior of Stabilized 18 Per Cent Chromium-8 Per Cent Nickel Steels in Concentrated Nitric Acid. Raymond S. Stewart and Stephen F. Urban. *American Society for Testing Materials,* "Symposium on the Nature, Occurrence, and Effects of Sigma Phase," 1951, p. 128-145.

The sigma phase as the responsible factor for the low corrosion resistance of Ti-stabilized austenitic stainless steels in boiling 65% HNO_3. Factors influencing the formation of sigma phase were studied. 14 ref.
(R5, N6, SS)

408-R. An Investigation of the Longevity of Galvanized Roofing Sheets and Wires. D. J. Swaine. *Chemistry & Industry,* Sept. 15, 1951, p. 764-767.

Investigation of some old and some modern roofing sheets and wires showed that the coating weight of the old materials is greater than that of the modern ones. The difference in other factors, such as purity of coating, Zn-Fe alloy layer, and base material does not indicate a reason for the superior atmospheric corrosion resistance of the old products. The life of a Zn coating depends almost solely on the thickness of the Zn layer. 14 ref.
(R3, L16, Zn, CN)

409-R. Causes of Breakdown in Steam Plant. *Institution of Mechanical Engineers, Proceedings,* v. 164, No. 2, 1951, p. 129-136.

A discussion by various speakers. Causes include mechanical failure of metals, stress-corrosion, reliance on

automatic controls and vibrations of parts. (R1, Q general)

410-R. Corrosion of Steel Railway Sleepers: Final Report. J. C. Hudson. *Journal of the Iron and Steel Institute,* v. 169, Sept. 1951, p. 13-16.

The wastage caused by rusting and abrasion of copper-bearing steel sleepers was compared with that suffered by ordinary mild steel sleepers in service tests lasting up to 14 years and made at five places on the British Railways. Under normal circumstances, the resistance of steel sleepers to rusting is adequate, but it can be appreciably increased by using Cu-bearing steel. (R3, T23, CN, AY)

411-R. Oxidation of Titanium. M. H. Davies and C. E. Birchenall. *Journal of Metals,* v. 3, Oct. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 877-880.

Oxidation rate in the range 650°-950° C, was measured. The linear rate law obtained is explained by interface reaction control of the process. Tracer experiments indicate the oxygen diffuses in at least one phase of the scale. 14 ref. (R2, Ti)

412-R. On the Mechanism and Kinetics of the Scaling of Iron. M. H. Davies, M. T. Simnad, and C. E. Birchenall. *Journal of Metals,* v. 3, Oct. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 889-896.

A brief survey of the solid phases of the iron-oxygen system, the stability of wüstite in bulk and in thin films, the relative densities of iron in the metal and oxides, and the kinetics of formation of oxide scales on iron. New experimental results were introduced at several points and an attempt was made to formulate a mechanistic picture consistent with these observations. Experimental techniques. 32 ref. (R2, Fe)

413-R. High Temperature Oxidation of Copper-Palladium and Copper-Platinum Alloys. D. E. Thomas. *Journal of Metals,* v. 3, Oct. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 926-936.

Oxidation rate constants were determined for Cu-Pd and Cu-Pt alloys as a function of alloy composition and temperature. Reaction products were identified. Relationship between oxidation rate constants and diffusion constants in the reaction zones. 11 ref. (R2, Cu, Pd, Pt)

414-R. High Chromium Steels Resist Attack by Liquid Bismuth Alloys. John L. Everhart and Edgar L. Van Nuis. *Materials & Methods,* v. 34, Oct. 1951, p. 112-114.

Properties of some of the bismuth alloys. Their use in heat transfer applications depends on suitable material to contain them. Corrosion tests on a number of constructional materials. High-Cr alloys are more resistant than Ni-Cr materials. (R6, P11, SS, Bi)

415-R. Passivity of Type 304. Reed Knox, Jr. *Metal Progress,* v. 60, Sept. 1951, p. 77-78.

During corrosion tests on Type 304 stainless steel in hot 15% H_2SO_4 containing 1.25% NaCl, some unusual phenomena were observed in connection with passivation. Suggests that presence of residual Mo (0.17-0.18%) is responsible for a difference in behavior. (R10, SS)

416-R. Rust Preventives—A General Survey. Arnold W. Ackerman. *Plating,* v. 38, Oct. 1951, p. 1047-1051.

Rust preventives fall in three main classifications: fluids applied at room temperature from solutions and deposited as relatively thin films upon solvent evaporation; solids of various types and consistencies, applied hot; and lubricating oils. Applications. (R10, L general, Fe)

417-R. Corrosion-Prevention Program for a T.C.C. Unit Gas Plant. C. A. Murray and M. A. Furth. *Proceedings, Sixteenth Mid-Year Meeting, Division of Refining, American Petroleum Institute,* v. 31M (III), 1951, p. 99-105; disc., p. 105-106.

Previously abstracted from *Oil and Gas Journal.* See item 227-R, 1951. (R10)

418-R. Hydrogen Attack of Steel in Refinery Equipment. R. T. Effinger, M. L. Renquist, A. Wachter, and J. G. Wilson. *Proceedings, Sixteenth Mid-Year Meeting, Division of Refining, American Petroleum Institute,* v. 31M (III), 1951, p. 107-130; disc., p. 130-133.

Previously abstracted from *Oil and Gas Journal.* See item 237-R, 1951. (R1, N1, CN)

419-R. Industry's Rust Loss Bill Can Be Reduced. George A. Daubert. *Steel,* v. 129, Oct. 11, 1951, p. 81, 84.

Various techniques available for protection of metal parts from corrosion. Four general types specified are solvent dispensol coatings, hot-dip compounds, rust-inhibiting oils, and the volatile, chemically treated papers. (R10, L14, St)

420-R. Periodic Oscillation; Obtained During Anodic Solution of Silver. (In French.) Claude Chalin. *Comptes Rendus Hébdomadaires des Séances de*

l'Académie des Sciences, v. 233, July 30, 1951, p. 362-364.

Results of experiments applied to operation of an electrolyzer composed of a 1-mm.-diam. Ag wire anode and a Pt cathode, in an aqueous solution of KCN. (R1, Ag)

421-R. Economics of Rectifier Installation for Cathodic Protection of a Bare Pipe Line. D. C. Glass. *Corrosion.* (Technical Section), v. 7, Oct. 1951, p. 322-325; disc., p. 325-326.

A report on 10 years' operating experience with rectifiers for cathodic protection of a 10-in. crude oil pipe line in the Texas-Gulf Coast area. Design of the system and performance data on rectifiers, experience with ground beds, current requirements to maintain protection, bonding procedures with parallel and/or crossing foreign structures, and leak frequency. An economic study is made of the system. (R10, ST)

422-R. Filamentary Growths on Metal Surfaces—"Whiskers." K. G. Compton, A. Mendizza, and S. M. Arnold. *Corrosion.* (Technical Section), v. 7, Oct. 1951, p. 327-334.

Growths found on metal surfaces of some of the parts used in telephone communications equipment, particularly on parts shielded from free circulation of air. Mechanism of growth of the whiskers, found not only on Cd-plated parts but also on other metals. Approximately 1000 test specimens of different metals, solid and plated, were exposed under various conditions. Effects of humidity and presence of various organic materials, different film thicknesses and methods of application, surface preparation and supplementary treatments, chemical and physical properties, and X-ray studies of structure. (R general, Ti)

423-R. Effect of Specimen Shape on Corrosion in the Atmosphere. H. R. Copson. *Corrosion,* (Technical Section), v. 7, Oct. 1951, p. 335-338.

It is axiomatic that corrosion rate increases with amount of contamination actually coming in contact with the specimen. This is controlled not only by shape and form of pollution present, but also by shape and form of the specimen. While this seems obvious it has generally been overlooked in the published literature. Illustrations. Compares plain and threaded bars; wire and sheet specimens; insect screen. Various metals and alloys are involved. 10 ref. (R11)

424-R. Passivating Characteristics of the Stainless Steels. W. G. Renshaw and J. A. Ferree. *Corrosion* (Technical Section), v. 7, Oct. 1951, p. 353-360.

Investigation indicates that the rate of film growth and the "degree of passivity" attained vary considerably under different conditions. Solution potential measurements offer a convenient means of following the progress of film formation. Data show the behavior of stainless steel specimens in various solutions and in air after a prior chemical activation. A comparison of several stainless steel types in regard to their passivating characteristics, and effect of surface finish. 11 ref. (R10, SS)

425-R. Corrosion Resistance of Alloys in Amine Gas Treating Systems. F. C. Riesenfeld and C. L. Blohm. *Petroleum Refiner,* v. 30, Oct. 1951, p. 107-115.

Previously abstracted from *American Society of Mechanical Engineers.* See item 42-R, 1951. (R9, R5, Al, Ni, AY, CN, SS)

426-R. Analyses of Some Corrosion Problems in Petroleum Refineries. John F. Mason, Jr. *Petroleum Refiner,* v. 30, Oct. 1951, p. 124-131.

Fifteen case records of actual corrosion problems, which concern the initial use of carbon steel for various equipment items and their premature failure for one reason or another. Among the services involved are gas oil, depropanized naphtha, crude oil, spent H_2SO_4 alkylate, naphthenic base crudes, caustic soda and sodium plumbite, furfural, reduced crude vapors, and cracked propane distillate. (R7)

427-R. Corrosion Data of Welded Low-Carbon Stainless Steel. H. F. Ebling and M. A. Scheil. *Welding Journal,* v. 30, Oct. 1951, p. 511s-518s.

Corrosion resistances of welded, heat treated alloys and weld deposits of the unstabilized low-carbon Type 304 (18-8) were determined and compared to those of the stabilized grades of 18-8 alloys containing Cb, Cb-Ta or Ti. Corrosion resistance was based on the standard boiling HNO_3 test. 10 ref. (R5, SS)

428-R. An Investigation of the Corrosion of Domestic Hot Water Tanks. P. J. Sereda, W. R. Thomas, and M. Cohen. *Canadian Journal of Technology,* v. 29, Oct. 1951, p. 435-446.

Results based on physical and metallographic examination of tanks taken from 15 localities in Ontario. Evidence shows that polarity of the Zn-Fe couple reverses under certain service conditions. 14 ref. (R4, Zn, ST)

429-R. Corrosion of Copper Powder; Recent Russian Research. *Chemical Age,* v. 65, Oct. 6, 1951, p. 471-473.

Reviews recent work of Pomosov

and co-workers, also other Russian investigators. (R general, Cu)

430-R. Materials of Construction vs. Hydrogen Peroxide. *Chemical Engineering,* v. 58, Oct. 1951, p. 263-264, 266-268, 270-271.

Revision of article by J. S. Reichert and R. H. Pete, which appeared originally in the Apr. 1947 issue. Followed by short articles by other authors: "Nickel & Nickel Alloys," W. Z. Friend; "High-Silicon Irons," Walter A. Luce; "Glass Lining," S. W. McCann; "Worthite," W. E. Pratt; "Silicones," J. A. McHard and Leon Van Volkinburg; "Chlorimets," Walter A. Luce; "Carbon & Graphite," W. M. Gaylord; "Cements," Raymond B. Seymour; and "Durimet 20," Walter A. Luce. (R6)

431-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 107A-108A, 110A.

Third of a series summarizing corrosion data in chart form presents concentrations and temperatures for Durimet 20 by H_2SO. (R5, SS)

432-R. Corrosion Experiments with Gaseous Boron Trifluoride. F. Hudswell, J. S. Nairn and K. L. Wilkinson. *Journal of Applied Chemistry,* v. 1, Aug. 1951, p. 333-336.

A number of constructional materials—metals, alloys and miscellaneous compounds—which may be required to come into contact with BF_3—were subjected to treatment with this gas under carefully controlled conditions. Many of the materials examined showed a high resistance to chemical attack. The following metals can be safely used in apparatus for handling dry BF_3: stainless steel, mild steel, copper, nickel, monel metal, brass, and aluminum, and the more noble metals up to at least 200° C. (R9)

433-R. The Corrosion of a Steel Surface by Condensed Films of Sulphuric Acid. D. Flint and R. W. Kear. *Journal of Applied Chemistry,* v. 1, Sept. 1951, p. 388-393.

Experimental technique. Rate of corrosion increases with increasing H_2SO_4 dew-point; and irrespective of dew-point temperature, rate of corrosion reaches a maximum at a surface temperature of the steel between 20 and 45° C. below that of the dew-point. 12 ref. (R5, ST)

434-R. The Influence of Carbon Smokes on the Corrosion of Metal Surfaces Exposed to Flue Gases Containing Sulphur Trioxide. R. W. Kear. *Journal of Applied Chemistry,* v. 1, Sept. 1951, p. 393-399.

Results obtained confirm the view that a peak rate in corrosion exists at 20-45° C. below the dew-point of the gas and that the presence of carbon smokes can profoundly affect the extent of corrosion. Comparison of the behavior of filtered and unfiltered smoke-laden gases indicates that carbon reduces the SO_3 content of flue gases by physical adsorption. (R9, CN)

435-R. 15 Corrosion Case Histories in Petroleum Refineries. John F. Mason, Jr. *Oil and Gas Journal,* v. 50, Oct. 18, 1951, p. 114, 117, 119-124, 126.

Previously abstracted under similar title from *Petroleum Refiner.* See item 426-R, 1951. (R7)

436-R. The Prevention of Embrittlement Cracking. A. A. Berk. *Transactions of the American Society of Mechanical Engineers,* v. 73, Oct. 1951, p. 859-862; disc., p. 862-864.

Nitrate, quebracho tannin, and zero-caustic treatment were applied successfully in stationary plants to prevent cracking in embrittlement-detector specimens. On one large railroad, prevention of cracking in detector specimens has paralleled a spectacular decrease in boiler-seam cracking in locomotive engines. The principal conclusion from a survey of cracking in stationary boilers in the last ten years is that embrittlement is not a frequent occurrence. 14 ref. (R10, S21, ST)

437-R. A Standard Laboratory Corrosion Test for Metals in Phosphoric-Acid Service. H. F. Ebling and M. A. Scheil. *Transactions of the American Society of Mechanical Engineers,* v. 73, Oct. 1951, p. 975-987; disc., p. 987.

Some possible difficulties and their corrections. The relation between the laboratory test and field experience. A table of laboratory corrosion test results is presented as a guide in selecting metals for phosphoric-acid service. (R11, R5, SG-g)

438-R. Methods and Apparatus for Determining Resistance of Metals to Stress Corrosion. (In Polish.) E. Gasior. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 3, 1951, p. 241-250.

Methods fall into two groups: those involving constant load and those involving constant strain. Details of both types (including diagrams) and their relative merits. 28 ref. (R11, R1)

439-R. Prevention of Corrosion in Naval Aircraft. Part I. N. E. Promisel and G. S. Mustin. *Corrosion,* (Technical Section), v. 7, Oct. 1951, p. 339-352; Nov. 1951, p. 377-388; disc., p. 388-389.

Conditions encountered and some of the methods used in combatting corrosion in naval aircraft. Some of the special problems which have been encountered and for which acceptable solutions have been found. A wide variety of metals and alloys

is used in various aircraft parts. Photographs show typical corroded parts. Use of coatings and surface treatments. 18 ref.
(R10, L general, T24)

440-R. Protection of Electric Equipment Against Corrosion. H. E. Springer. *Electrical Engineering,* v. 70, Nov. 1951, p. 956. (A condensation. To be published in *A I E E Transactions,* v. 70, 1951)

Ways to accomplish this are to remove the equipment from the corrosive atmosphere or to provide equipment designed to operate in it. (R10, T1)

441-R. Structural Changes Sabotage Corrosion-Resistant Liners. J. H. van Swaal. *Iron Age,* v. 168, Nov. 8, 1951, p. 138-142.

Corrosion resistant steels used as a liner material in chemical and petroleum industry apparatus frequently undergo structural changes which impair the liner's toughness. Types of corrosion resistant Cr-Ni steels. Mechanical properties and weldability characteristics.
(R6, R7, Q general, K9, SS)

442-R. A Bibliography on Cathodic Protection. F. A. Rohrman. *World Oil,* v. 133, Nov. 1951, p. 286, 288.

Sixty-nine additional references to complete a bibliography published in the July issue. (R10)

443-R. Corrosion of Metals; Metals Under Stress: 1. Aluminium. P. F. Thompson. *Department of Supply, Aeronautical Research Consultative Committee, Commonwealth of Australia.* Report ACA-49, July 1950, 22 pages.

Time-potential curves were determined simultaneously of stressed and unstressed electrodes of commercially pure Al. The effects of aeration and deaeration of tap and salt water were determined for short and long-period applications of increasing stresses. Conclusions indicate that stresses are but contributory factors in the so-called process of "stress-corrosion".
(R1, Al)

444-R. Relation Between the Nature and Sensitivity to Corrosion of Grain Boundaries of Aluminum-Magnesium Solid Solutions Containing 7% Magnesium. (In French.) Pierre A. Jacquet. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Sept. 10, 1951, p. 621-623.

Electron-microscope investigation for a commercial Al alloy at 160-250° C. in an NaCl solution.
(R11, M21, Al)

445-R. Developments in Corrosion and Corrosion Prevention of Iron and Steel. (In German.) Heinrich Steinrath. *Stahl und Eisen,* v. 71, July 19, 1951, p. 785-792; Aug. 16, 1951, p. 894-899.

Surveys literature published in 1948 and 1949. 324 ref.
(R general, ST)

446-R. The Passivation of Tin-Plate. (In German.) W. Eilender. *Werkstoff und Korrosion,* v. 2, Aug. 1951, p. 289-292.

Passivating solutions are examined for hot-dipped and electrolytically coated tin plate for protection against sulfur compounds (food), oxidation on heating, and against atmospheric corrosion. Solutions of chromate had a favorable effect only when wetting agents or phosphates were added. Includes test-panel photographs. (R10, Sn)

447-R. Corrosion Resistance of Aluminum Bronze. (In German.) Erich Franke. *Werkstoff und Korrosion,* v. 2, Aug. 1951, p. 298-307.

Extensive data on corrosion resistance in various media under different conditions are tabulated. 45 ref. (R general, Cu)

448-R. Resistance Polarization. II. Its Change With Time and Resulting Predictions on Polarization Phenomena in Metal-Coating-Solution Systems. (In German.) Georg Falk, Martin Krieg, and Erich Lange. *Zeitschrift für Elektrochemie und angewandte Physikalische Chemie,* v. 55, July 1951, p. 396-404.

Experimental apparatus and procedure for investigating the behavior of corroding metals in aqueous solutions. Measurements were made on the systems of Pb and Ag with halogen acids and of Pb in H_2SO_4. 21 ref. (R11, Ag, Pb)

449-R. Variation of Rate of Solution of Steel in Sulfuric Acid With Pressure. (In Russian.) S. A. Balezin and A. G. Tulaeva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 78, May 1, 1951, p. 75-77.

Influence of pressure on rate of solution of steel in acid in the presence of inhibitors and accelerators was investigated and causes of this influence studied. (R5, ST)

450-R. Accelerated Oxidation of Metals at High Temperatures. Anton de S. Brasunas and Nicholas J. Grant. *American Society for Metals,* Preprint 3W, 1951, 30 pages.

Certain metals which contain elements that form oxides of low melting point or high vapor pressure have been observed to be susceptible to "accelerated oxidation". It was found that the oxide formed on the 16-25-6 Cr-Ni-Mo alloy is a spinel having about 27% interconnected porosity. Atmospheric oxygen thus

has easy access to the oxide-metal interface. Moving atmospheres which increase the rate of vaporization of volatile oxides definitely retard the oxidation rate of metals which form such substances during oxidation. Of the 16-25-6-type alloys only those containing more than 30% Ni were found to have satisfactory oxidation resistant properties. 17 ref. (R1, SS, SG-h)

451-R. Area Effects in Crevice Corrosion. O. B. Ellis and F. L. LaQue. *Corrosion* (Technical Section), v. 7, Nov. 1951, p. 362-364.

Specimens of stainless steel were prepared to provide an experimental approximation of a crevice relatively small with reference to the area outside exposed to the corrosive. Test panels were exposed to running fresh sea water for 87 days. Data confirmed expectations that extent of attack within a crevice was proportional to the area of freely exposed metal outside. This means that greatest danger exists when a crevice is associated with large area of freely exposed metal and that when area of metal outside a crevice approaches zero, extent of corrosion within a crevice also will approach zero and will be determined only by access of the corrosive medium and oxygen to surfaces within the crevice. (R1, SS)

452-R. Effect of Packaging on Corrosion of Zinc Plated Equipment. K. G. Compton, S. M. Arnold, and A. Mendizza. *Corrosion* (Technical Section), v. 7, Nov. 1951, p. 365-372.

Laboratory tests on equipment having Zn-plated parts produced corrosion to an extent comparable to that encountered in the field and which is known to be caused by condensation of atmospheric moisture. The greatest corrosion occurred when the parts were packed in plywood boxes, somewhat less in fiberboard, and least when packed in corrugated-paper boxes. The investigation also showed that a supplementary chromate treatment provides a marked increase in resistance to corrosion. (R3, Zn)

453-R. Historic Church's Copper Roof Good After 213 Years. A. W. Tracy. *Corrosion* (Technical Section), v. 7, Nov. 1951, p. 373-375.

Examination of English-made Cu sheets taken from the roof of Christ Church, Philadelphia, after 213 years' exposure, shows a weathering loss of 0.007 in. at thinnest areas, equivalent to a corrosion rate of 0.000033 in. per year. It is believed that the essentially rural character of the atmosphere during early exposure of these sheets contributed to their life. Recent corrosion tests on sheets in an industrial atmosphere show somewhat higher rates. Includes results of chemical analysis of the copper and of the corrosion products. (R3, Cu)

454-R. Performance of a Comprehensive Group of Coatings on Steel. Immersion and Atmospheric Exposures, 1949—. H. W. Mundt and L. J. Thompson. *Corrosion* (Technical Section), v. 7, Nov. 1951, p. 376.

Summary and conclusions from report on laboratory and short-term field-exposure performance tests for a comprehensive group of 159 corrosion and fouling retardant or preventive organic coating materials. These materials were used either separately or in combination in 139 protective systems which were applied to steel-panel specimens and exposed to seven different tropical environments. (R11, L26, ST)

455-R. Control of Sour Crude Corrosion in Kansas Production Operations. L. C. Case. *Corrosion* (Technical Section), v. 7, Nov. 1951, p. 390-396, disc., p. 396.

Corrosion prevention practice in Kansas which has resulted from many years' experimentation with resistant materials and methods of well treatment. Experimental materials have included plastic tubing, various alloy rods and tubing, galvanized tubing, plastic-coated, and cement-lined tubing. Treating methods have included exclusion of possible oxygen, neutralization agents and protective scale in addition to formaldehyde and oil wetting agents. Includes economic analysis. (R7, R10, L26, ST)

456-R. Corrosion Inhibition in Gas Condensate Wells By Intermittent Injection of Alkali Solutions. Charles C. Nathan. *Corrosion* (Technical Section), v. 7, Nov. 1951, p. 397-399.

Experiments carried on by producing research laboratory of Texas Co. in efforts to reduce corrosion in gas-condensate wells in which the casing is mudded off from the tubing. (R10, ST)

457-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 43, Nov. 1951, p. 113A-114A, 116A.

Effects of concentration and temperature on corrosion by H_2SO_4 of a Ni-base Ni-Mo-Cr alloy known as Chlorimet. (R5, Ni)

458-R. Action of Dilute Inorganic Acids on Stainless Steel. Charles F. Poe and R. M. Malcom. *Industrial and Engineering Chemistry,* v. 43, Nov. 1951, p. 2572-2575.

A study to determine what effects, if any, some of the more common inorganic acids have on a Cr-Ni stainless steel. 12 ref. (R5, SS)

459-R. Investigation of Certain Corrosion Inhibitors. (In Russian.) S. A. Balezin and S. R. Novikov. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 24, Mar. 1951, p. 283-288.

Inhibiting actions of formaldehyde, thiodiglycol, and henamethylenetetramine were investigated on steel plates containing 0.18% C. immersed in HCl and H_2SO_4 at room temperature. (R10, ST)

460-R. (Book) **Corrosion—Causes and Prevention.** Ed. 3. Frank N. Speller. 686 pages. 1951. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. $10.00.

Deals particularly with the ferrous metals. Explains corrosion, its kinds, and factors of its nature and occurrence. How to prevent corrosion in various fields of engineering work. New sections were added on biological influence and cathodic protection, and the most recent advances in practical preventives. (R general)

SECTION S

INSPECTION and CONTROL

1-S. Determination of Traces of Silicon in Vanadium and Uranium; Spectrophotometric Method. Ruth Guenther and Richard H. Gale. *Analytical Chemistry,* v. 22, Dec. 1950, p. 1510-1511.

Previously abstracted under similar title from *U. S. Atomic Energy Commission,* AECD-2792, Nov. 8, 1949. See item 154-S, 1950. (S11, V, U)

2-S. Spectrophotometric Determination of Beryllium in Aluminum with Sulfosalicylic Acid. H. V. Meek and Charles V. Banks. *Analytical Chemistry,* v. 22, Dec. 1950, p. 1512-1516.

Procedure is designed for the range of 0.0015-0.23% Be, but may be conveniently changed to accommodate much higher or lower ranges. (S11, Al, Be)

3-S. Colorimetric Determination of Copper in Steel with Rubeanic Acid. Walter L. Miller, Isidore Geld, and Max Quatinetz. *Analytical Chemistry,* v. 22, Dec. 1950, p. 1572-1573. (S11, Cu, ST)

4-S. Birthmarking Alloy Steels Would Save Time and Material. *Steel,* v. 127, Dec. 25, 1950, p. 54-56.

Universal standards for continuous ink stamping are suggested as answer to current confusion over coding. (S10, AY)

5-S. Determination of Oxygen in Zirconium Metal. E. B. Read and L. P. Zopatti. *U. S. Atomic Energy Commission,* AECD-2798, Feb. 14, 1950, 7 pages.

A vacuum-fusion technique. The procedure makes use of the fact that Zr and most of the metallic impurities may be volatilized as chlorides upon treatment with dry HCl gas at a temperature as low as 450° C. Includes diagram of apparatus. (S11, Zr)

6-S. Metallurgical Trends in Production of Steel Plates. W. Barr. *Engineering,* v. 170, Dec. 1, 1950, p. 453. (A condensation.)

An address. Trends in compositions, test methods, specifications, and applications. (S22, Q general, ST)

7-S. Influence of Character of Surfaces on Condensation of Molecular Jets of Antimony. (In French.) Gustave Ribaud and Marcel Devienne. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Oct. 16, 1950, p. 740-742.

Compares two different techniques, both utilizing jets of radioactive Sb. In one, the density of the deposit is evaluated by use of a Geiger counter. In the other an autoradiographic technique is used, in which the metal is deposited across the division line between plates of two different metals. If there is any essential difference in the receptivity of the two metals for the deposit, this fact is visually apparent. Results for Cu and Al, also for deposition on glass. (S19, L17, Sb, Cu, Al)

8-S. Remarks Concerning the Planochromometric Method of Glazunov and Jirovsky for Rapid Determination of Sulfur in Steel. (In Czech.) Jan Korecky and Josef Nejedly. *Hutnické Listy,* v. 5, Sept. 1950, p. 359-362.

Above method (reported in 1948) was investigated. Several disadvantages were found to exist. Comparison with the combustion method shows that, contrary to Glazunov and Jirovsky's paper, the latter is more rapid. (S11, ST)

9-S. Open Hearth Bath Pyrometers. H. B. Emerick. *Blast Furnace and Steel Plant,* v. 38, Dec. 1950, p. 1425-1427.

Various types. (S16, D2, ST)

10-S. Titanium and Its Alloys. Walter C. McCrone and Julian Glasser. *Frontier,* v. 13, Dec. 1950, p. 12-15.

Present analytical methods and

need for improvements and new methods in production control, specifications, fundamental research, and applied research.
(S11, S12, S22, Ti)

11-S. Statistical Quality Control. Harry A. Schwartz. *Foundry,* v. 79, Jan. 1951, p. 94-95, 223-224.
Application to production of malleable iron and steel castings at the five plants of National Malleable and Steel Castings Co.
(S12, E general, CI)

12-S. The Use of Radioactive Isotopes in Industrial Radiography. Gerold H. Tenney. *Non-Destructive Testing,* v. 9, Fall 1950, p. 6-8.
Literature is reviewed. The production of isotopes and selection of the best type of isotope from the standpoint of industrial radiography. 13 ref. (S19)

13-S. Inspection of Crane Hooks by the Magnetic Particle Method. Martin B. Graham. *Non-Destructive Testing,* v. 9, Fall 1950, p. 9-10.
Procedure. Micrographs show effect of annealing on microstructure of cold-worked crane hooks.
(S13, CN)

14-S. Radiologic Safety in Radiography With Isotopes. Thomas N. White. *Non-Destructive Testing,* v. 9, Fall 1950, p. 19-22.
Safety problems encountered in use of radium and radioactive isotopes in radiography. Special attention is given to some problems that might not be apparent from reading the literature, or which are thought deserving of particular emphasis. An appendix includes more detailed information and a selected bibliography. 20 ref. (S19, A7)

15-S. For Successful Production Welding Know Your Metals. Jay Bland. *Industry & Welding,* v. 24, Jan. 1951, p. 30, 32-33.
Simple methods of identification of metals: magnet and spot tests; chisel tests; and hardness tests.
(S10)

16-S. Direct-Reading Spectrometer Speeds Steel Production. Earl R. Vance. *Western Machinery and Steel World,* v. 41, Dec. 1950, p. 46-47.
Use by Timken Roller Bearing Co. for analysis of preliminary and ladle tests from the melt shop. (S11, St)

17-S. Importance of Surface Finish as Applied to Gage Blocks. H. J. Chamberland. *Western Machinery and Steel World,* v. 41, Dec. 1950, p. 64-66.
Surface finish standards. Methods of surface finishing gage blocks. Inspection procedures. (S15)

18-S. Aluminium in Aluminium-Bronze; Some Observations on the Rate of Mercury Cathode Electrolysis. E. C. Mills and S. E. Hermon. *Metal Industry,* v. 77, Dec. 15, 1950, p. 275-276.
Experiments on rate of removal, under specific conditions, of unwanted elements from Al bronze by mercury-cathode electrolysis prior to determination of aluminum in certain Al bronzes. (S11, Cu, Al)

19-S. Some Considerations Concerning Determination of the Weight of Silver on the Active Faces of Mirrors. (In French). A. Scaut. *Verres et Réfractaires,* v. 4, Oct. 1950, p. 287-292.
Describes a new potentiometric method for the above, also for determination of thickness of the silver deposit. The method also detects irregularities of the deposit. Theoretical bases of the method and data. (S15, Ag)

20-S. Measuring the Temperature of Hardening. (In German.) Walter Zschaage. *Archiv für technisches Messen,* Nov. 1950, p. T121-T122 (4 p.)
Various methods and equipment for measuring heat treating temperatures. 25 ref. (S16, J general)

21-S. Researches on the Surface-Technology in Japan. (In English.) Makoto Okoshi. *Japan Science Review,* ser. 1, v. 1, Mar. 1949, p. 101-109.
Abstracts of various research papers published in Japan; also a general summary. Fields covered are abrasion, lubrication, characteristics of finished metallic surfaces, and apparatus for determination of surface roughness. (S15)

22-S. Research on Measurement of the Temperature of Molten Steel. (In English.) Kiyoshi Sasagawa, Hidetsugu Hotta, and Tadaichi Omuro. *Japan Science Review,* ser. 1, v. 1, Mar. 1949, p. 179-189.
Details of a W-Mo thermocouple and protective shield. The part immersed in molten steel is covered by a carbon tube coated with SiC by a sintering process. Temperature distributions in the atmosphere and in the melt of openhearth and electric steel furnaces under various conditions were determined.
(S16, D2, D5, ST, W, Mo, SG-a)

23-S. Study on Surface of Casting. (In English.) Kazuo Katori. *Journal of Mechanical Laboratory,* v. 4, Mar. 1950 (Special No.), p. 32-36.
Effects of various factors on the smoothness or roughness of surfaces of sand castings. Both mold and casting surfaces were studied using optical and feeler methods.
(S15, E11)

24-S. Examination of the Tracer Method With the Electron Microscope. (In Japanese.) Atsushi Inoue and

Riitsu Takagi. *Journal of Mechanical Laboratory,* v. 4, Mar. 1950, p. 47-49.

Surface-roughness measurement with pointed feelers. Accuracy of the method was studied by means of the electron microscope. Micrographs illustrate results obtained for brass surfaces. (S15, M21, Cu)

25-S. Radioactive Tracers Detect Soil on Cleaned Surfaces. *Steel,* v. 128, Jan. 15, 1951, p. 102-104. (Based on paper by J. C. Harris, R. E. Kamp, and W. H. Yanko.

Previously abstracted from *Journal of the Electrochemical Society,* under similar title. See item 492-S, 1950. (S15, S19, L12)

26-S. Measuring the Thickness of Thin Coatings With Radiation Backscattering. Eric Clarke, J. R. Carlin, and W. E. Barbour, Jr. *Electrical Engineering,* v. 70, Jan. 1951, p. 35-37.

Nondestructive process which can be used in production wherever measurement is to be made of coating which has a different atomic number from the backing material. (S14)

27-S. Rapid Analysis Cuts Furnace Holding Time. L. Silverman, H. E. Schwartz, and B. Chalett. *Iron Age,* v. 167, Jan. 18, 1951, p. 70-72.

How rapid control analysis of furnace heats with the photometer reduces the length of time the heat must be maintained at high temperature. A new procedure was developed for colorimetric control of the base metal and important constituents of Mn bronze. (S11, Cu)

28-S. Economy Through Better Control of Reinforcing Steel. F. Tessitor and P. Rosewarne. *Journal of the American Concrete Institute,* v. 22, Dec. 1950; *Proceedings of the American Concrete Institute,* v. 47, 1950, p. 333-340.

Difficulties encountered through use of reinforcement steels not in strict accordance with present-day specifications. Simplification of materials requirements, liberalization of code requirements to permit hot bending of bars, and permanent identification of grade of steel would, in large measure, permit designers to apply reinforcement to structures in a more effective manner. (S22, T26, ST)

29-S. An Improved Vacuum Fusion Furnace. W. G. Guldner. *Bell Laboratories Record,* v. 29, Jan. 1951, p. 18-20.

Furnace, developed for use in determining the gas content of metals. (S11)

30-S. Rotary Printer Speeds Sheet and Strip Stenciling. Carl A. Banze. *Steel,* v. 128, Jan. 22, 1951, p. 92, 94.

Imprinting identification data on surface of steel while in transit through rolls is now accomplished automatically by a revolving cylinder. Rubber type is held securely in the die while in service on a high-speed temper mill. (S10)

31-S. Practical Toolmaking. Part I. J. Y. Riedel. *Modern Machine Shop,* v. 23, Jan. 1951, p. 104-108, 110-111, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140.

The basic causes of tool failures, both before and after the tools are put in service. Includes design, fabrication, and metallurgical factors. Heat treatment procedures. (S21, J26, TS)

32-S. Flaw Detection With Supersonic Waves. R. Brown. *Canadian Metals,* v. 13, Dec. 1950, p. 24-25, 29.

Use of the Hughes Supersonic Flaw Detector (British-made). (S13)

33-S. Applications of the Electronic Tubes to the Measurements of Temperature. Jean Schwartz. *Microtechnic,* (English Edition.) v. 4, Sept.-Oct. 1950, p. 247-253. (Translated from the French.)

"Bail type" regulators and compensating devices. Begins section on electronic amplifiers and their applications. Diagrams show temperature-time diagrams of furnaces under different types of control. (To be continued.) (S16)

34-S. Gamma Ray Metallography. Jean Ternisien. *Microtechnic,* (English Edition.) v. 4, Sept.-Oct. 1950, p. 269-275. (Translated from the French.)

First installment. Introduction and sections on radioactive elements; discovery of radioactivity; coefficients of the law of transformation; radioactive equilibrium; the family of radioelements; and atomic numbers of radioactive isotopes. (To be continued.) (S19, M23)

35-S. Methods of Measurement and Definition of Surfaces (Continued). H. Becker, Wetzlar. *Microtechnic,* (English Edition.) v. 4, Sept.-Oct. 1950, p. 276-282. (Translated from the German.)

Concludes section on optical methods. Largely devoted to "feeler" or profilometer methods and equipment. (To be continued.) (S15)

36-S. Presidential Address. S. F. Dorey. *Institution of Mechanical Engineers Proceedings,* v. 162, No. 3, 1950, p. 368-377.

Experiences in the fields of boilers and pressure vessels (design, materials selection, caustic cracking, corrosion, and welding); marine-engine shafting (elastic hysteresis, corrosion fatigue, torsional vibration, and other causes of service

failures); marine-reduction gearing (design and machining); hull vibration and engine balance; and strain measurement. 15 ref. (S21, R1, Q9, ST)

37-S. (Book) **Symposium on Application of Statistics.** *American Society for Testing Materials,* 1916 Race St., Philadelphia 3, Pa. Special Technical Publication No. 103, 1949, 36 pages. $1.00.

Consists of "Introduction," by C. M. Wakeman, plus the following papers: "The Economic Relationship Between Design and Acceptance Specifications", Eugene L. Grant; "Precision and Accuracy of Test Methods," Grant Wernimont; "Use of Statistics to Determine Precision of Test Methods", W. J. Youden and J. M. Cameron; and "Modern Quality Control" (introduction to a motion picture), Simon Collier. Includes discussions. (S12)

38-S. (Book) **Colorimetric Determination of Traces of Metals. Ed. 2.** E. B. Sandell. 673 pages. 1950. Interscience Publishers, 250 Fifth Ave., New York 1, N. Y. $9.

Methods of separation and isolation of substances, colorimetry and spectrophotometry in trace analysis, and general colorimetric reagents. Procedures for 45 elements and rare earths. (S11)

39-S. (Book) **Metals and Alloys.** 214 pages. 1950. Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, New York. $5.00.

See abstract of "Metals and Alloys. Ed. 5," published by Iliffe and Sons, Ltd., London, England. (Item 12-183, 1949). (S22)

40-S. Instrumentation for Metallurgy. R. R. Webster. *Metal Progress,* v. 59, Jan. 1951, p. 86-92.

Developments of past ten years as applied to various metallurgical operations, including analysis, testing, inspection, and research. (S general)

41-S. German and American Stainless Compared. C. A. Zapffe. *Iron Age,* v. 167, Jan. 25, 1951, p. 56-60.

Currently used compositions of wrought stainless steels have recently been standardized in Germany in a manner similar to AISI classifications in the U. S. Comparison of standard German and American listings. (S22, SS)

42-S. Light Metals and Their Alloys Codified. R. B. Smith. *Iron Age,* v. 167, Jan. 25, 1951, p. 65-70.

New, uniform system is now officially adopted by ASTM. It will be combined with the temper designations in use since 1948. Extensive tables give ASTM and commercial designations plus chemical composition limits and applicable ASTM specification for a wide-variety of Al and Mg alloys. (S22, Al, Mg)

43-S. Engineering Aspects of Tool and Die Welding. Part II. Classification of Tool and Die Steels. Arthur R. Butler. *Tool Engineer,* v. 26, Jan. 1951, p. 42-45.

Compositions and properties of the various types. (S22, T6, TS)

44-S. Statistical Quality Control Cuts Inspection Costs $100,000. David C. Peterson. *Steel,* v. 128, Jan. 29, 1951, p. 58-62, 80, 82.

During the last 2½ years, Stewart-Warner effected the above savings through replacement of 100% inspection by sampling inspection of Alemite hydraulic fittings. Description of system includes tables and graphs. (S12)

45-S. Report of Committee 15—Iron and Steel Structures. J. L. Beckel, chairman. *American Railway Engineering Association, Bulletin,* v. 52, Jan. 1951, p. 445-478.

Reports on revisions of rules for rating existing iron and steel bridges; revisions of specifications for movable railway bridges; design of steel bridge details; and specifications for design of corrugated metal culverts, including corrugated metal arches. (S22, T26, ST)

46-S. Emission Spectrography. J. Sherman. "Physical Methods in Chemical Analysis". Vol. I, Academic Press Inc., New York, 1950, p. 255-332.

Laboratory setup and economics. Spectrographs, densitometers, excitation sources, material and electrode preparation, the photographic plate, and analysis. 32 ref. (S11)

47-S. An Electronic Recording Analytical Balance. Idas W. Lohmann. *Review of Scientific Instruments,* v. 21, Dec. 1950, p. 999-1002.

The instrument is free of mechanical connections with the balance beam, direct-reading, sensitive, and rapid. All mechanical and electrical contactors have been eliminated from the instrument proper. The construction is simple. For work requiring a continuous record of changes in weight with respect to time, the instrument should prove to be most valuable. (S11)

48-S. A Method for Determining Uranium and Thorium in Rocks by the Nuclear Photographic Plate. J. W. Bremner. *Proceedings of the Physical Society,* v. 64, sec. A, Jan. 1, 1951, p. 25-31.

A nuclear photographic emulsion which has been in contact with material containing traces of uranium and thorium shows, on processing,

α-ray stars arising from atoms which have undergone several successive disintegrations during exposure. The relative frequency of the various multiple stars, which depends on the U-Th ratio, is evaluated to show the possibility of determining these elements by star counting. (S11, S19, U, Th)

49-S. Supersonic Examination of Boiler Plate and Welded Seams. *Engineering,* v. 171, Jan. 5, 1951, p. 29-30.

Problems involved in interpretation of results of supersonic testing and radiographic inspection. Methods used by Babcock & Wilcox, Ltd. Argues that present British Standard Specifications are unnecessarily severe. It may be possible to reduce greatly the amount of radiographic work by proper application of supersonic testing, with accompanying cost savings. (S13)

50-S. Temperature Control of Slot or Batch Type Steel Forging Furnaces. J. A. Hartnell. *Journal of the Birmingham Metallurgical Society,* v. 30, Dec. 1950, p. 152-155.

(S19, F21)

51-S. A New Surface Pyrometer. M. D. Drury and T. Land. *Journal of the Birmingham Metallurgical Society,* v. 30, Dec. 1950, p. 156-159.

Development of a new instrument of high accuracy for measurement of the surface temperatures of hot metal in the form of ingots, sheets, and strips as well as furnace walls and other surfaces. It is based on collection of thermal radiation. (S16)

52-S. Gamma, X-Ray Control Piping Quality. *Industry & Welding,* v. 24, Feb. 1951, p. 44, 65.

Use of Gamma and X-ray inspection on welds in Texas-to-Ohio natural-gas pipe line. Arc welding operations. (S13, K1, CN)

53-S. Alternate Steels Useful as Substitutes for Critical Materials. Edwin Laird Cady. *Materials & Methods,* v. 33, Jan. 1951, p. 62-63.

Use of the leaner NE steels (now called Tentative Standard steels) which are again proving valuable as replacements for scarce alloy grades. (S22, AY)

54-S. Tool Refinements Aid Buick Output. Herbert Chase. *Modern Machine Shop,* v. 23, Feb. 1951, p. 162, 164, 166.

Black-light unit used to check carbide bits for cracks also helps to spot causes of failures. (S13, C-n)

55-S. A Method of Estimating Thickness of Hot-Metal Mixer Linings. L. L. Wells. *Brick & Clay Record,* v. 118, Feb. 1951, p. 49-50.

Use of "Tempilstiks" (temperature-indicating crayons) for approximate measurement of shell temperatures. From these temperatures, lining thicknesses can be estimated with sufficient accuracy for most purposes. Test data were gathered over a period of years. (S16)

56-S. Automatic Inspection of Pipe. J. E. Clarke, R. A. Peterson, T. J. Dunsheath. *Welding Engineer,* v. 36, Feb. 1951, p. 38-42.

New magnetic-particle equipment which inspects seam-welded pipe just after it leaves the welding wheels. (S13, CN)

57-S. Light Absorption Spectrometry. M. G. Mellon. *Analytical Chemistry,* v. 23, Jan. 1951, p. 2-7.

A review. 217 ref. (S11)

58-S. Automatic Operations in Analytical Chemistry. Gordon D. Patterson, Jr., and M. G. Mellon. *Analytical Chemistry,* v. 23, Jan. 1951, p. 101-115.

A review. 483 ref. (S11)

59-S. Determining Traces of Oxygen in Bismuth Metal. E. S. Funston and Sherman A. Reed. *Analytical Chemistry,* v. 23, Jan. 1951, p. 190-191.

Hydrogen-reduction procedure and apparatus. 11 ref. (S11, Bi)

60-S. The Detection of Columbite by Ultraviolet Light. Robert A. Mackay. *Bulletin of the Institution of Mining and Metallurgy,* Jan. 1951; *Transactions,* v. 60, pt. 4, 1950-51, p. 129-131.

A simple flux, used in a metal dish, can render columbite fluorescent to ultraviolet light and so make its detection in a concentrate relatively easy. (S11, Cb)

61-S. A Test for the Dimensional Stability of Gauges by an X-Ray Diffraction Method. C. Wainwright and L. W. Nickols. *Metallurgia,* v. 42, Dec. 1950, p. 401-404.

Method in which breadth of the lines in the X-ray diffraction pattern of the steel is measured by use of a Geiger-Müller counter spectrometer. The method will not, however, distinguish between stable and unstable conditions if the gage has been so severely heated in machining as to cause a structural change in the surface layers. (S14)

62-S. Current Light-Alloy Specifications. (Corrected to December 1, 1950). *Light Metals,* v. 14, Jan. 1951, p. 18-32.

British specifications.

(S22, Al, Mg)

63-S. Spectrochemical Analysis of Steelmaking Slags. C. Georg Carlsson and John T. M. Yü. *Journal of the Iron and Steel Institute,* v. 166, Dec. 1950, p. 273-280.

Procedure for determination of $CaO-SiO_2$ ratio of openhearth and electric-furnace slags and for complete analysis of such slags. The sample is mixed with graphite powder and pressed into a briquette, which is subjected to a low-tension arc-like triggered spark for excitation. Percentages of the oxides are calculated by use of a "mutual standard method". Accuracy compares favorably with routine chemical analysis, and time necessary for a complete analysis is only about ½ hr. 26 ref. (S11, D2, D5, ST)

64-S. Contribution of the Source Unit to Variability in Spectrographic Analysis. *Journal of the Iron and Steel Institute,* v. 166, Dec. 1950, p. 325-328.

A more comprehensive study of source behavior, based on the technique outlined in an earlier paper, has confirmed that 20-50% of the total error in spectrographic ferrous analysis, using photographic recording, can be traced to source contribution. Some of the factors affecting this contribution and possibilities of improved source performance are considered. (S11, Fe, ST)

65-S. A Statistical Study of the Behaviour of Spectrographic Source Units. H. T. Shirley, A. Oldfield, and H. Kitchen. *Journal of the Iron and Steel Institute,* v. 166, Dec. 1950, p. 329-338.

Influence of factors operative during excitation. Comparison of various types of excitation unit, particularly of the ordinary uncontrolled Hilger high-voltage condensed spark unit and the Metro-Vickers controlled low-voltage source. Most favorable results are obtained with the simple Hilger unit, operating with a graphite auxiliary electrode and a 2½-mm. gap. 10 ref. (S11, AY)

66-S. Naval Gearing: War Experience and Present Development. J. H. Joughin. *Engineering,* v. 171, Jan. 5, 1951, p. 25-27; Jan. 12, 1951, p. 55-56. (A condensation.)

Various examples of failures and excessive wear. Causes and possible remedies on the basis of work of the National Physical Laboratory in Britain. (S21, Q9, CN)

67-S. Advances in the Field of Optical Pyrometry in the Years 1940-1950. (In German.) Joachim Euler. *Zeitschrift für angewandte Physik,* v. 2, Dec. 10, 1950, p. 505-509.

Reviews literature. 54 ref. (S16)

68-S. An Improved Type of Thickness Tester. (In English.) Kan-ichi Kamiyoshi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Oct. 1949, p. 335-339.

Magnetic tester by which thickness of a metal wall can be measured when access cannot be gained to both sides. It is portable, simple in operation, and durable, and can be applied to nearly all sorts of curved surfaces. Maximum thickness is about 10 mm. for Cr-Mo steel and larger for mild steel, and accuracy is about 10% for mild steel 5 mm. thick. (S14)

69-S. On the Flow of the Magnetic Flux in a Metal Plate for a Thickness Gage. (In English.) Sakae Tanaka. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Dec. 1949, p. 451-456.

A convenient method for field measurement of the thickness of a metal plate only one side of which is readily accessible. The problem of the three-dimensional flow of magnetic flux penetrating into a metal plate, when steady or alternating magnetomotive force is supplied between two points on its surface. Results obtained by calculations were verified experimentally. (S14)

70-S. Electric Controllers for Laboratory Furnaces. M. H. Roberts. *Electronic Engineering,* v. 23, Feb. 1951, p. 51-54.

Two designs of temperature controller for laboratory electric resistance furnaces. The general design is based on previous circuits used by Prosser, Coates, and Yates, but more emphasis is placed upon simplicity of construction, operating economy, use of standard components, and design for maximum life expectation and minimum probability of breakdown. The first design gives simple two-position control while the second gives proportional control from maximum to nearly zero. (S16)

71-S. Measurement of Surface Smoothness. Henry L. Kellner. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 105-122; disc., p. 122-124.

Microscopic methods, the microinterferometer, electromechanical instruments, acoustical methods, replica techniques, the electron microscope, and methods involving reflectance. 23 ref. (S15)

72-S. Measurement of Surface Roughness of Electrodeposited and Electropolished Surfaces by Means of the Microinterferometer. Arthur G. Strang and Fielding Ogburn. *Proceedings, American Electroplaters' Society,* v. 37, 1950, p. 125-136.

The Zeiss micro-interferometer developed in Germany during World War II. Interpretation of micrographs; possible applications. In-

cludes an optical diagram of the apparatus and numerous micrographs. (S15)

73-S. Control of Liquid-Steel Temperatures in Hearth and Ladle. F. A. VonGruenigen and W. D. Lawther. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 114-127; disc., p. 127-130.

Results obtained through the use of the bath pyrometers. An extensive series of measurements of molten-metal temperatures in the foundry. (S16, D2, D9, ST)

74-S. Open Hearth Bath-Temperature Measurement and Control. J. A. Creighton. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 33, 1950, p. 184-186; disc., p. 186.

Previously abstracted from *Journal of Metals.* See item 316-S, 1950. (S16, D2, ST)

75-S. Metal Specifications for the Brass and Bronze Foundry. James G. Dick. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 208-214; disc., p. 214-216.

Previously abstracted from *Canadian Metals.* See item 325-S, 1950. (S22, E general, Cu)

76-S. Metal Composition Tests for the Steel Melter. H. H. Fairfield, H. F. Graham and A. E. McMeekin. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 530-535; disc., p. 535-536.

Previously abstracted from preprint. See item 208-S, 1950. (S11, CN)

77-S. Outline of Inspection for Pearlitic Malleable Castings. D. T. Martin. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 692-698; disc., p. 698.

Foundry, white iron, grind, and finished iron inspection; induced magnetic testing for surface defects; hardness testing; and salvage and returned goods inspection. (S13, Q29, CI)

78-S. Classification, Standardization, and Properties of Bronzes. (In French.) G. Blanc and P. J. Le Thomas. *Fonderie,* Nov. 1950, p. 2257-2266.

Structures corresponding to various compositions and heat treatments are illustrated. Compositions and mechanical properties are tabulated. (S22, Q general, Cu)

79-S. Methods of Measurement Used in French Openhearth Furnaces. (In French.) G. Husson and P. Rodicq. *Revue de Métallurgie,* v. 47, Dec. 1950, p. 937-946.

Temperature and flow measurement and control devices and instruments. (S16, S18, D2, ST)

80-S. (Book) **1950 Supplement to Book of A.S.T.M. Standards Including Tentatives. Part 2. Non-Ferrous Metals.** 223 pages. 1950. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. (S22, EG-a)

81-S. (Book) **Boiler Construction Code.** 1949 Ed. Secs. I-VII, IX. 1950. Ed. Sec. VIII. Paged by section. American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y. (S22, T25)

82-S. (Book) **Analytical Chemistry of the Manhattan Project.** Ed. 1. Clement J. Rodden, editor-in-chief. 748 pages. 1950. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. (National Nuclear Energy Series, Div. VIII., Vol. 1.) $6.75.

Past and present practices in the separation and determination of U and Th in many types of materials. Determination of traces of other specific elements or group of elements in various materials. Developments in photometric, electrometric, spectrochemical, low-pressure, radiochemical, and other methods. Extensive chapter bibliographies. (S11, U, Th)

83-S. (Book) **Physical Methods in Chemical Analysis. Vol. I.** Walter G. Berl, editor. 664 pages. 1950. Academic Press, Inc., 125 E. 23rd St., New York 10, N. Y.

Fourteen contributors describe methods that have either proved of considerable value or are destined to play an important role in the future. Various unit operations: the techniques and instruments that can be used by the analyst in the identification, both qualitative and quantitative, of atomic, molecular, and ionic species, crystal phases and arrangements, surface structures and area, etc. Extensive sectional bibliographies. Pertinent sections are abstracted separately. (S11, M general)

84-S. A Noncontact Temperature Measuring Device. J. E. Field and S. D. German. *Journal of Applied Physics,* v. 22, Jan. 1951, p. 106-107.

Radiation-thermocouple device designed to measure, record, or control the surface temperatures of moving rolls, belts, or materials, in a relatively low temperature range. (S16)

85-S. How One Manufacturer Uses New Dy-Chek Inspection Method. Fred M. Burt. *Machine and Tool Blue Book,* v. 47, Mar. 1951, p. 94, 96, 98, 100, 102.

How Byron Jackson Co. is using

the Dy-Chek method for inspecting bulky parts used in the manufacture of turbine and centrifugal pumps. (S13)

86-S. Multi-Channel Apparatus for Recording Temperatures. W. I. J. Price and J. J. Trott. *Journal of Scientific Instruments,* v. 28, Jan. 1951, p. 15-17.

Apparatus was developed for investigation of temperature gradients in various road surfaces and subgrades, an experiment involving continuous recording from 60 thermocouples. Readings of each thermocouple were recorded every half-hour for periods up to 100 hr. (S16)

87-S. Laboratory and Workshop Notes. *Journal of Scientific Instruments,* v. 28, Jan. 1951, p. 27-30.

Consists of the following: "An Improved Heated Cell for Infra-Red Spectroscopy," L. Brown and P. Holliday; "The Collection of Small Samples for Examination by X-Ray Powder Methods," R. Brooks and T. C. Alcock; "Rotary Film Evaporator for Laboratory Use," S. M. Partridge; "The Mounting and Centring of Specimens in High Temperature X-Ray Powder Cameras," E. G. Stewart; "The Oiling of Small Mechanisms," P. C. Smethurst; and "A Charging Device for the Fountain Pen Dosimeter," S. Eklund and L. Hedlund. (S11, M22, M23)

88-S. A Photo-Electric Temperature Controller for Multi-Point Operation. G. Mayer, D. R. Thorneycroft, and A. G. Haynes. *Sheet Metal Industries,* v. 28, Feb. 1951, p. 155-157, 166.

Equipment used for control of 12 electrically heated pot furnaces containing molten metal. (S16)

89-S. Test for the Dimensional Stability of Gauges. C. Wainwright and L. W. Nickols. *Engineering,* v. 171, Feb. 2, 1951, p. 141-142.

See abstract under similar title from *Metallurgia,* item 61-S, 1951. (S14)

90-S. Crystal Amplifier Opens New Fields for Low-Power X-Ray Inspection. *Steel,* v. 128, Feb. 26, 1951, p. 82.

New system for high-speed, automatic X-ray inspection announced by General Electric X-Ray Corp. A semiconducting CdS crystal is the fundamental component of the system. (S13)

91-S. ASTM Committee A-1 Revises Steel Specifications, Tests. *Steel,* v. 128, Feb. 26, 1951, p. 88, 90, 93, 96, 98.

Changes in standards related to steel springs, carbon and alloy bars, pipe and tubing, bolting materials, valves, flanges, and fittings for high and low-temperature service, steel forgings, plates, structural steel, and other products. (S22, ST)

92-S. Nondestructive Testing of Engineering Materials and Parts. R. C. McMaster and S. A. Wenk. *Materials & Methods,* v. 33, Feb. 1951, p. 81-96.

Basic facts about all the available methods, and the capabilities and limitations of each. Penetrating-radiation methods; ultrasonic testing; magnetic-particle testing; penetrant methods; electromagnetic-induction tests; and tribo-electric tests. (S13)

93-S. Ferrous Metallurgy. H. F. Beeghly. *Analytical Chemistry,* v. 23, Feb. 16, 1951, p. 228-231.

Recent advances in analytical chemistry. 90 ref. (S11)

94-S. Spectrophotometric Study of the Platinum (IV)-Tin (II) Chloride System. Gilbert H. Ayres and Albert S. Meyer, Jr. *Analytical Chemistry,* v. 23, Feb. 16, 1951, p. 299-304.

Part of a general study of the analytical reactions of the platinum metals. A study was made of possible interference by many cations and common reagent anions; in general, the spectrophotometric method shows greater tolerance than gravimetric methods. The method, without loss of accuracy, saves time in determination of Pt and permits use of less rigorous preliminary separations. 17 ref. (S11, Pt)

95-S. Spectrophotometric Determination of Molybdenum With Phenylhydrazine Hydrochloride. Gilbert H. Ayres and Bartholomew L. Tuffly. *Analytical Chemistry,* v. 23, Feb. 16, 1951, p. 304-308.

Determination as applied to steel analysis. The usual alloying elements do not interfere. The method is simple, rapid, and accurate; and it is applicable in a steel analysis without change in usual dissolution procedures. 10 ref. (S11, ST)

96-S. Determination of Oxygen in Zirconium Metal by the Vacuum Fusion Method. J. K. Stanley, Joan von Hoene, and George Wiener. *Analytical Chemistry,* v. 23, Feb. 16, 1951, p. 377-379.

Typical results are tabulated. (S11, Zr)

97-S. Instrument and Control Maintenance in a Steel Mill. J. H. Cuthbert. *Instruments,* v. 24, Feb. 1951, p. 212-215; *I.S.A. Journal,* v. 7, Feb. 1951, p. 16-19.

Instrumentation of a large steel mill, and some of the problems encountered in metering, and controls. Experimentation on noble-metal thermocouple compensating lead wire. (S16, S18)

98-S. Two New Inspection Devices. *Automotive Industries,* v. 104, Mar. 1, 1951, p. 44-45, 56.

Automatic gaging machine for cylinder bores, and an instrument for precision checking of measurements of gears and camshafts—recent additions to Ford equipment. (S14)

99-S. Automatic Controls Increase Openhearth Tonnage. A. Robinson. *Iron Age,* v. 167, Mar. 8, 1951, p. 92-96.

Summary of a recent conference held by the British Iron & Steel Research Assn. How several openhearth furnaces are safely being driven at top temperatures for a larger proportion of working time. Their roof pyrometers automatically control fuel flow, resulting in greater tonnage and some fuel saving. (S16, D2, ST)

100-S. Report on Assignment 1: Revision of Manual. C. J. Code, chairman. *American Railway Engineering Association Bulletin,* v. 52, Feb. 1951, p. 596-605.

Part of Report of Committee 4 on Rail. Recommended revisions of specifications for openhearth steel rails, for quenched carbon-steel joint bars, and for heat treated carbon and alloy steel track bolts. (S22, T23, CN, AY)

101-S. Investigation of Failures in Railroad Rails. R. E. Cramer. *American Railway Engineering Association Bulletin,* v. 52, Feb. 1951, p. 605-617.

Part of Report on Assignment 2, "Conditions Affecting Service Life of Rail, Causes of Rail Failures and Other Defects," from Report of Committee 4 on Rail. 23 failed control-cooled rails from 16 railroads were subjected to laboratory examination. Distribution of fracture types and causes is tabulated. Fabrication procedures at Algoma steel mill were investigated in order to clarify causes of failures. (S21, T23, CN)

102-S. Report on Assignment 3: Rail Failure Statistics. Ray McBrian, chairman. *American Railway Engineering Association Bulletin,* v. 52, Feb. 1951, p. 617-629.

Part of Report of Committee 4 on Rail. Reports submitted by most U. S. and Canadian railways for the period up to Dec. 31, 1949, are correlated and analyzed. (S21, T23, CN)

103-S. Report on Assignment 7: Service Tests of Various Types of Joint Bars. T. A. Blair, chairman. *American Railway Engineering Association Bulletin,* v. 52, Feb. 1951, p. 634-647.

Part of Report of Committee 4 on Rail. Progress report on stress measurement on the C. & N.W.R.R.; effect of train speed; range of dynamic stresses; and frequency of stress occurrence. (S21, Q25, T23, CN)

104-S. Ninth Progress Report of the Rolling-Load Tests of Joint Bars. R. S. Jensen. *American Railway Engineering Association Bulletin,* v. 52, Feb. 1951, p. 648-659.

Part of "Report on Assignment 8: Joint Bar Wear and Failures; Revision of Design and Specifications for New Bars and Bars for Maintenance Repairs," from Report of Committee 4 on Rail. Results of experimental work at University of Illinois. (S21, Q9, T23, CN)

105-S. Report on Assignment 9: Rail Fractures Resulting from Engine Wheel Burns, Including Effect on Repairing Such Burns by Oxyacetylene or Electric Welding. J. B. Akers. *American Railway Engineering Association Bulletin,* v. 52, Feb. 1951, p. 661.

Part of Report of Committee 4 on Rail. Brief report on work of past year. (S21, K1, K2, T23, CN)

106-S. Service Tests on the Burlington Railroad Near Fort Morgan, Colo., of Joint Bars of Different Metallurgies. *American Railway Engineering Association Bulletin,* v. 52, Feb. 1951, p. 659-660.

Part of "Report on Assignment 8: Joint Bar Wear and Failures; Revision of Design and Specifications for New Bars and Bars for Maintenance Repairs," from Report of Committee 4 on Rail. (S21, T23, CN)

107-S. Report on Assignment 10: Causes of Shelly Spots and Head Checks in Rail: Methods for Their Prevention. L. S. Crane, chairman. *American Railway Engineering Association Bulletin,* v. 52, Feb. 1951, p. 661-679.

Part of Report of Committee 4 on Rail. First section: results of service tests on the C. & O., the Pennsylvania, and the N. & W. (Appendix by R. E. Cramer is abstracted separately; see next item.) (S21, T23, CN)

108-S. Ninth Progress Report of the Shelly Rail Stuides at the University of Illinois. R. E. Cramer. *American Railway Engineering Association Bulletin,* v. 52, Feb. 1951, p. 664-679.

Results of rolling-load and physical tests of heat treated rails. Includes tests on seven rails which were flame hardened different amounts on the rail treads. Tests on two specimens of alloy rail steel containing about 1.35% Mn, 0.90% Cr, and 0.12% V, with 0.75% C. Seven detail fractures from shelling were examined in the laboratory. A new cradle-type rolling-load machine was designed. Technique used to produce electron micrographs. (S21, Q general, T23, CN, AY)

109-S. How to Eliminate Faulty Parts and Materials With Quality

Control. Harry D. Greenwood. *Western Metals,* v. 9, Feb. 1951, p. 36-38.

Second of a series on quality control at Kaiser Steel Corp. Control over refining; foundry physical control; welding inspection; shaping operations; and procedure adjustments. (S12, ST)

110-S. Checking for Failures; Inspection by the Dye Penetrant Method. *Western Machinery and Steel World,* Feb. 1951, p. 68.

Application to swaged cable fittings. (S13)

111-S. Determination of the Iron Content of Chromium Plating Baths by the Centrifuge Method. Mara Tagliabue and Benito d'Alessandro. *Electroplating and Metal Finishing,* v. 4, Feb. 1951, p. 49-50. (Translated from *Galvano Tecnica,* v. 1, no. 1, 1950, p. 28-30.)

(S11, L17, Fe, Cr)

112-S. Radiation Pyrometry in the Steel Industry. Donald Robertson. *Mechanical Engineering,* v. 73, Mar. 1951, p. 198-202.

Clarified by diagrams and illustrations of the various types of apparatus. (S16, ST)

113-S. Pyrometry in the Nonferrous Foundry. Robert A. Colton. *Foundry,* v. 79, Feb. 1951, p. 98-100, 243-245; Mar. 1951, p. 88-89, 234-237.

First installment: the various advantages of temperature control. Second installment: the different types of instruments for measuring the temperature of molten nonferrous metals. Recommendations for care and use of pyrometers. (S19, E10, EG-a)

114-S. Founders Object to Inspection Methods. J. W. Bryant. *Foundry,* v. 79, Mar. 1951, p. 126, 129.

Flaws in the present Naval Ordnance Specifications and more particularly flaws in the inspection system. Experiences of bronze foundries, although similar difficulties were probably encountered in other materials. (S13, E general, Cu)

115-S. Detecting Tramp Metal in Logs and Iron Ore. C. W. Clapp, *Electronics,* v. 24, Mar. 1951, p. 88-93.

Problem of detecting a spherical metal particle in an alternating magnetic field, and two practical applications of the solution—detecting bullets and shell fragments in logs partially submerged in sea water, and detecting broken drill bits and other tramp metal in highly magnetic taconite iron ore. (S10, Fe)

116-S. Methods for Testing Thickness of Electrodeposits. II. Comparison of Methods for Nickel on Steel. Harold J. Read and F. Ross Lorenz. *Plating,* v. 38, Mar. 1951, p. 255-263.

Details of thorough experimental evaluation of the Magne-gage, BNF jet-test, microscopic, stripping, and cathode-gain-in-weight methods. (S14, L17)

117-S. The Great Flaw Hunt. *Fortune,* v. 43, Mar. 1951, p. 103-106, 108.

Variety of new methods and apparatus for nondestructive testing of metals. (S13)

118-S. A Rapid Polarographic Determination of Copper, Cadmium, and Zinc in Silver Base Alloys. E. G. Ford. *Canadian Journal of Technology,* v. 29, Feb. 1951, p. 61-65.

(S11, Cu, Cd, Zn, Ag)

119-S. Radioactive Isotopes in Industry. I. Metallurgy. *Atomics* (London), v. 2, Feb. 1951, p. 39-42.

Some of the more interesting applications. (S19)

120-S. Quality Control of Fabricated Pipework for the Oil Industry. E. P. S. Gardner. *Welding and Metal Fabrication,* v. 19, Feb. 1951, p. 59-64.

Details of American and British practice for welded pipelines. (S12, K general, ST)

121-S. Inspection of Butt Welded Pipe Joints; The Use of Trepanners and Introscopes. *Welding and Metal Fabrication,* v. 19, Feb. 1951, p. 65-67.

Equipment and procedures. (S13)

122-S. Measurement of High Temperatures. (In French.) G. Ribaud. "Les hautes Températures et leurs Utilisations en Chimie, Vol. II" (Masson et Cie., Paris), 1950, p. 776-800.

Different types of instruments. Range of different thermocouple materials. (S16, SG-a)

123-S. Regulation of Temperatures. (In French.) G. Bouchet. "Les hautes Températures et leurs Utilisation en Chimie, Vol. II,, (Masson et Cie., Paris), 1950, p. 801-806.

Regulation of high temperatures by means of a newly developed device using a photoelectric cell. (S16)

124-S. Regulation of the Temperature of Furnaces. (In French.) Gustave Ribaud. "Les hautes Températures et leurs Utilisation en Chimie, Vol. II" (Masson et Cie., Paris), 1950, p. 1305-1321.

Various methods and apparatus other than those using an expanding wire. These include resistance thermometers, thermocouples, and optical pyrometers. Mechanical systems and electrical circuits. 19 ref. (S16)

125-S. New AISI Steels Conserve Mn, Ni, Cr, and Mo. *Steel,* v. 128, Mar. 12, 1951, p. 116, 118.

The 80Bxx series is designed to have hardenability equivalent to the 86xx steels at the same carbon con-

tent. Ranges and limits of composition are tabulated. (S22, AY)

126-S. An Evaluation of Radiography With Particular Emphasis on Detection Methods. Carlton H. Hastings. *ASTM Bulletin,* Feb. 1951, p. 66-70.

Past trends, present status, and suggested future trends in industrial radiography. Techniques employing radiation methods for producing inspection data of greater reliability and at faster rates than now possible are suggested. (S13)

127-S. Magnaflux Inspection of Welded Storage Tanks. *Welding Journal,* v. 30, Mar. 1951, p. 233-234.

R. Schnurman discusses above paper by F. A. Upson, (Jan. 1950 issue; item 30-S, 1950). Hazards often encountered in magnetic-inspection work can be avoided by the use of a high-quality "magnetic ink" instead of the dusting of powder. In author's reply, some critical comments are made concerning the suggested procedure. (S13)

128-S. Report on Split Steam Lead at New Orleans. A. W. Rankin and W. A. Reich. *American Society of Mechanical Engineers,* Paper 50-A-75, 1950, 11 pages.

Study of a split steam lead section (1% + Mo, 0.25% V alloy steel). X-ray and magnetic-particle tests, mechanical property tests, chemical analysis, macroscopic and microscopic examination, and study of weld X-ray films.
(S13, S11, Q general, M27, M28, AY)

129-S. (Book) Spectrochemical Analysis. L. H. Ahrens. 346 pages. 1950. Addison-Wesley Press, Kendall Sq. Bldg., Cambridge 42, Mass. $10.00.

Spectrochemical analysis in general. Special problems in analyzing rock, ore, mineral, and soil samples, integrating new developments. Content also applies to the analysis of ceramic materials, refractories, slag, and biological ash. 22-page bibliography. (S11)

130-S. Television in Industry. J. A. Good. *Iron and Steel Engineer,* v. 28, Mar. 1951, p. 107-110; disc. p. 110-111.

Possible applications in the steel plant for communication and control purposes. (S18)

131-S. The Determination of Chrysocolla in Copper Ores. R. S. Young and H. R. Simpson. *Mining Magazine,* **v. 84,** Mar. 1951, p. 137-139.

Since chrysocolla is not recovered by froth flotation, it is sometimes desirable to determine this mineral rapidly in Cu ores or tailings. Based on the fact that chrysocolla is considerably lighter than other common minerals, a simple procedure is described for determination of this constituent which involves separation in tetrabromoethane followed by the usual chemical analysis for Cu.
(S11, Cu)

132-S. Review of Tracer Techniques in Metallurgy. G. H. Guest. *Metal Progress,* v. 59, Mar. 1951, p. 366-370.

Use to solve problems in ore dressing, smelting and refining, utilization of materials, and physical metallurgy. (S19)

133-S. Intelligent Testing and Inspection of Forgings Assures High Quality at Lower Cost. Lester F. Spencer. *Materials & Methods,* v. 33, Mar. 1951, p. 77-80.

Use of dimensional checking, metallurgical examination, and physical and nondestructive testing for evaluating plain-carbon, alloy, and stainless steel forgings during manufacture. (S13, S14, ST)

134-S. Substitute Grades Suggested for Scarce Stainless Steel. Kenneth Rose. *Materials & Methods,* v. 33, Mar. 1951, p. 87-88.

Acceptable alternates for conventional welding grades and Ni-bearing types. (S22, SS)

135-S. A Simple Temperature-Controlled Laboratory Furnace. R. S. Barnes. *Journal of Scientific Instruments,* v. 28, Mar. 1951, p. 89-92.
(S16, M23)

136-S. Designation of Metallic Surfaces. Part I. Helmut Thielsch and George Stroman. *Metal Finishing,* v. 48, Sept. 1950, p. 66-70.

First of a series explaining the fundamentals behind the measurement of surface qualities. Surface roughness, waviness, and lay (direction of the predominant surface pattern). Methods for rating surface roughness and surface waviness, and for converting one roughness value to another. 19 ref. (S15)

137-S. Determination of Sodium and Potassium in Lithium Metal by Flame Photometer. W. R. Inman, R. A. Rogers, and J A. Fournier. *Analytical Chemistry,* v. 23, Mar. 1951, p. 482-483.

The unusual properties of Li metal have caused recent interest in its use in metallurgy. Na and K are the chief impurities usually found. The method could be modified for the determination of Na and K in certain light alloys. (S11, Li, Na, K)

138-S. Colorimetric Determination of Rhenium. Emil E. Malouf and Merwin G. White. *Analytical Chemistry,* v. 23, Mar. 1951, p. 497-499.

Method for quantitative colorimetric determination of Re in samples containing as little as 0.1 microgram to 2.5 mg. per gram of sample. Determinations have been made in the presence of 125 mg. of Mo in a vol-

ume of 25 ml. The method is readily applicable to routine analytical laboratories. (S11, Re)

139-S. Colorimetric Determination of Nickel With Alpha-Furildioxime. A. R. Gahler, A. M. Mitchell, and M. G. Mellon. *Analytical Chemistry,* v. 23, Mar. 1951, p. 500-503.

Compares above with use of dimethylglyoxime or 1,2-cyclohexanedionedioxime. Applicability was shown by determination of Ni in a Mg alloy and in a NBS steel sample. 10 ref. (S11, Ni)

140-S. Precision Colorimetry; Application to Determination of Manganese. Irving G. Young and C. F. Hiskey. *Analytical Chemistry,* v. 23, Mar. 1951, p. 506-508.

The method developed utilizes periodate oxidation of Mn followed by a comparison of the unknown with the known solution of high absorbance. Data establish limits of precision and accuracy of the method when applied to pyrolusite ores. 14 ref. (S11, Mn)

141-S. Manual of Analytical Methods for the Determination of Uranium and Thorium in Their Ores. *New Brunswick Laboratory, U. S. Atomic Energy Commission,* Sept. 1950, 55 pages.

Chemical methods for the analysis of pitchblende, carnotite-bearing sandstone, shales, phosphate rock, and monazite sands. (S11, U, Th)

142-S. Methods of Testing Lacquer Coatings on Tinplate. W. E. Hoare. *Sheet Metal Industries,* v. 28, Mar. 1951, p. 231-233, 244.

Methods for measurement or estimation of continuity, thickness, adhesion, and hardness. 17 ref. (S15, L17, Sn, CN)

143-S. Metallurgical Polarographic Analysis; Polarometric Titrations. Jaroslav Heyrovsky. "Physical Methods in Chemical Analysis." Vol. II. Academic Press, New York, 1951, p. 1-49.

History, theory, apparatus, techniques of investigating solutions, sensitivity, and accuracy. Numerous applications. 58 ref. (S11)

144-S. Electrography and Electro-Spot Testing. H. W. Hermance and H. V. Wadlow. "Physical Methods in Chemical Analysis." Vol. II. Academic Press, New York, 1951, p. 155-228.

Equipment, materials, manipulative techniques, electrolytes, reagents, and developing processes. A variety of applications, including electro-spot testing for identifying pure metal surfaces, alloys, and anions; electrography for recording distributive patterns; and many others. Includes diagrams, photographs, tables, graphs, and electrographs. 49 ref. (S11, S10)

145-S. Magnetic Methods of Analysis. A. R. Kaufmann. "Physical Methods in Chemical Analysis." Vol. II. Academic Press, New York, 1951, p. 229-254.

Magnetic energy, force, and materials; production and measurement of magnetic fields; and apparatus for magnetic measurements. Magnetic test methods applied to oxygen in air, C in steel, phase transformations, single crystals, molecular structure, etc. 44 ref. (S11, M23)

146-S. Vacuum Techniques and Analysis. Benjamin B. Dayton. "Physical Methods in Chemical Analysis." Vol. II. Academic Press, New York, 1951, p. 333-386.

Methods of assembly and operation of vacuum systems constructed with the aid of modern diffusion pumps and unit parts available from manufacturers of scientific glass apparatus and vacuum equipment. The vacuum-fusion method for the analysis of gaseous elements in metals, determination of C by the low-pressure combustion method, microanalysis of gases, and analytical molecular distillation. Reviews the literature. 227 ref. (S11)

147-S. Design and Manufacture of Pressure Vessels. *International Chemical Engineering & Process Industries,* v. 32. Mar. 1951, p. 111-115.

Manufacturer's and users' views on British Standard 1500/1949. (S22, T26)

148-S. Methods of Measurement and Definition of Surfaces. (Concluded.) H. Becker. *Microtecnic* (English Ed.), v. 4, Nov.-Dec. 1950, p. 302-307. (Translated from the German).

German instruments and techniques. (S15)

149-S. Production Problems. II. Failure of Welt Needles. *Iron and Steel,* v. 24, Mar. 1951, p. 83-85.

Because of the premature breakages of welt needles of English manufacture, as compared with the behavior of American needles, a certain footwear manufacturer considered it desirable to have a complete metallurgical examination carried out to try to account for the difference in working life. Includes composition, surface finish, shape, hardness tests, pickling tests, and microstructures. Recommendations. (S21, CN)

150-S. Copper in White Metals; A Photometric Method of Determination. W. C. Coppins and J. W. Price. *Metal Industry,* v. 78, Mar. 16, 1951, p. 203-204.

Possibilities of direct determination of Cu and Fe by measurement of the color of the complex bromides. (S11, Sn, Pb, Sb, Cu)

151-S. Gamma Radiography in Shipbuilding and Engineering. J. D. Hislop. *Engineer,* v. 171, Mar. 16, 1951, p. 327-330.

Procedures and equipment. Fundamental principles. (S13)

152-S. Study of Surfaces of Castings. VIII. Measuring Methods for Casting Surfaces. (In Japanese.) Kazuo Katori, Tsuneyuki Okakura, and Kenji Hashimoto. *Journal of Mechanical Laboratory,* v. 4, Dec. 1950, p. 304-308.

The light cross-section method and tracer method were used. Comparative results. (S15)

153-S. Study of the Superfinishing Mechanism. I. (In Japanese.) Atsushi Inoue. *Journal of Mechanical Laboratory,* v. 4, Dec. 1950, p. 314-318.

The methods tested were the tracer method (magnification 1000 and 15,000), optical and electron-microscopic method, optical-reflection method (NF roughness tester) and interference method. Advantages and disadvantages of each. The last one was selected as best from the viewpoint of accuracy. (S15)

154-S. Isotopes at Work. Frank Charity. *Modern Machine Shop,* v. 23, Apr. 1951, p. 196-198, 200, 202, 204, 206, 208.

Some of the more interesting present-day industrial applications, especially in metallurgy and metalworking. 10 ref. (S19)

155-S. Measuring Thickness of Thin Coatings by Backscattering. *Electronics,* v. 24, Apr. 1951, p. 226, 228, 230.

Through the use of the system described, the following measurements are made possible: Sn or Zn on steel, paint or lacquer on metallic surfaces, rubber and plastic on calendering rolls, Se or Al or other backing materials, Ba coating on photographic paper, Cr or brass on steel, fillers in paper and plastics, porcelain coatings, metal surfaces, and plastic coatings on wire. (S14)

156-S. Development, Present State, and Outlook of Spot Test Analysis. Fritz Feigl. *American Society for Testing Materials,* "Symposium on Rapid Methods for the Identification of Metals," 1950, p. 1-11. (Translated from the German.)

A general review. 37 ref. (S10)

157-S. Electro Spot Testing and Electrography. H. W. Hermance and H. V. Wadlow. *American Society for Testing Materials,* "Symposium on Rapid Methods for the Identification of Metals," 1950, p. 12-34.

History, apparatus, operation, effects of treatment on metals, and applications of the above testing methods. Behavior of Pb, Fe, Cu, Ag, Ni, Co, Mo, Cr, Sn, Cd, Zn, Al, Mn, steels, and nonferrous alloys under various treatments. Diagrams and photographs of equipment, and electrographs of specimens after treatment. 10 ref. (S10, S11)

158-S. Instruments for Rapid Metal Identification. R. R. Webster. *American Society for Testing Materials,* "Symposium on Rapid Methods for the Identification of Metals," 1950, p. 35-48.

Instruments used in laboratories, manufacturing operations, and in the field for analysis of metals. Properties found useful in identification. Photographs of instruments and graphs showing typical instrument readings. 11 ref. (S10)

159-S. Separating Alloys by Relative Spot Tests. H. Kirtchik. *American Society for Testing Materials,* "Symposium on Rapid Methods for the Identification of Metals," 1950, p. 49-53.

Applications to a wide variety of ferrous and nonferrous alloys. (S10)

160-S. Rapid Methods for the Identification of Copper-Base Alloys. R. P. Nevers. *American Society for Testing Materials,* "Symposium on Rapid Methods for the Identification of Metals," 1950, p. 54-57.

Covers coppers and high-Cu alloys, bronzes, and brasses. Includes a flow sheet for each group. (S10, Cu)

161-S. Rapid Identification of Metal Finishes. A. Lewis and D. R. Evans. *American Society for Testing Materials,* "Symposium on Rapid Methods for the Identification of Metals," 1950, p. 58-60.

Portable spot-testing kit developed by Western Electric, now commercially available. Chart shows the sequence of analysis. (S10)

162-S. Examination of Plated and Protective Coatings by Electrographic Analysis. N. Galitzine and S. E. Q. Ashley. *American Society for Testing Materials,* "Symposium on Rapid Methods for the Identification of Metals," 1950, p. 61-68.

Application to plated or coated surfaces, and examination of them for holes. The apparatus, as well as electrographic prints. (S10, S11)

163-S. Field Test Kit and Procedure for Use in the Rapid Identification of Some Nickel Alloys and Stainless Steels. Henry B. Lea. *American Society for Testing Materials,* "Symposium

on Rapid Methods for the Identification of Metals," 1950, p. 69-72; disc. p. 72.

Use in identifying Ni; monel metal; Inconel; AISI 316 (18-8Mo), Cr-Ni, and Cr stainless steels; and carbon and low-alloy steels. (S10, Ni, CN, AY, SS)

164-S. Rapid Tests for Identifying Alloy Steels. Elbert C. Kirkman. *American Society for Testing Materials,* "Symposium on Rapid Methods for the Identification of Metals," 1950, p. 73-76.

Semi-quantitative spot-test methods. Reagents and equipment, and individual tests for Ni, Mn, Mo, Cr, and Co in stainless and high-alloy steel, as well as one for spot testing four steels simultaneously. (S10, SS, AY)

165-S. Development of Nondestructive Materials Testing. (In German.) Rudolf Berthold. *Chemie-Ingenieur-Technik,* v. 23, Jan. 28, 1951, p. 33-38; Feb. 14, 1951, p. 65-68.

Part I: methods and equipment developed and perfected in recent years, including irradiation and magnetic methods. Domestic and foreign procedures and equipment. Part II: electrical, acoustic, thermal, and chemical processes. 109 ref. (S13)

166-S. Rapid Shop Analysis and Determination of Changes in the Phosphorus Content in Copper and Copper-Alloy Melts. (In German.) H. von Zeppelin. *Giesserei,* v. 38, (new ser., v. 4), Feb. 8, 1951, p. 51-52.

Close correlation between P content and electrical conductivity makes it possible to control it by means of a modern electromagnetic measuring device. (S11, Cu)

167-S. Optical Temperature Measurements on Luminous Flames. (In German.) Gerhard Naeser and Werner Pepperhoff. *Archiv für das Eisenhüttenwesen,* v. 22, Jan.-Feb. 1951, p. 9-14.

Optical properties of luminous flames; calculation of the true flame temperature from the color and black temperature; wave-length dependence of absorption coefficient of luminous flames; and size of carbon particles in luminous flames. Measurement of flame temperatures with the color-brightness pyrometer. Includes a nomogram, tables, graphs, and eelctron micrographs. 12 ref. (S16)

168-S. The Use of Schematic Flow Diagrams in the Metallurgical Laboratory. (In German.) Hans Ulrich von Vogel. *Archiv für das Eisenhüttenwesen,* v. 22, Jan.-Feb. 1951, p. 31-36; disc. p. 36.

How flow charts of rapid methods for analysis of metals can greatly reduce the cost of experimentation. Illustrated by typical examples. (S11)

169-S. Progress in Steel-Plant Chemistry. (First Half of 1950.) (In German.) Paul Klinger. *Stahl und Eisen,* v. 71, Mar. 1, 1951, p. 252-255; Mar. 15, 1951, p. 300-304.

Emphasis is on analytical and test procedures. 50 ref. (S11, Fe, ST)

170-S. Comparative Tests With Different Separation Equipment for Magnetic Analysis. (In Swedish.) Sture Mörtsell. *Jernkontorets Annaler,* v. 134, No. 12, 1950, p. 572-581.

Comparative tests with a star magnet and a hand magnet showed that the hand magnet is much superior. Comparison between the Davis Magnetic Tube Tester and the hand magnet showed that for certain particle sizes and degrees of liberation about the same results could be obtained. The principal difference is that the hand magnet will separate mixed grains from clean magnet grains. Also hematite can be separated from other minerals by the hand magnet. (S10)

171-S. Evaluating the Characteristics of Glossy Finishes. Allen G. Gray. *Products Finishing,* v. 15, Apr. 1951, p. 46, 48, 52, 56, 58, 62, 64, 66, 68, 70, 74, 76. (Based on paper by H. R. Luck and R. C. Archibald.)

A method for photographing the details of glossy panels. The unique advantage cited for the technique is that the surface irregularities of an entire test panel may be revealed. The method makes it possible to put on the same photograph a comparison of the characteristics of the test panel and those of an ideal smooth glossy panel. (S15)

172-S. New Steel Compositions to Conserve Critical Alloying Elements. *Materials & Methods,* v. 33, Apr. 1951, p. 105, 107.

Five new grades of steel have been developed to conserve Mn, Ni, Cr, and Mo. These are the boron steels 80Bxx, 81Bxx, and 94Bxx, the 81xx steels, and the modified 86xx steels. Composition limits are tabulated. (S22, AY)

173-S. Experimental Spectroscopic Investiagtion of Welds. (In Russian.) E. S. Kudelya. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 76, Jan. 21, 1951, p. 395-397.

Method and technique for spectroscopic investigation of the surface layers of welds and hot cracking. Layers of metal 0.002 to 0.003 mm. thick were analyzed. Practical application of the method. (S11, K9)

174-S. (Book) **Symposium on Rapid Methods for the Identification of Metals.** *American Society for Testing Materials,* Special Technical Publication 98. 1950, 77 pages. $1.75.

Consists of nine papers presented at Atlantic City meeting, June 28, 1949, with accompanying general discussion. Individual papers are abstracted separately. (S10)

175-S. (Book) **ASTM Manual on Quality Control of Materials. Part I. Presentation of Data. Part 2. Presenting ± Limits of Uncertainty of an Observed Average. Part 3. Control Chart Method of Analysis and Presentation of Data.** *American Society for Testing Materials,* Special Technical Publication 15-C; 1951. 127 pages. $1.00. (S12)

176-S. (Book) **ASTM Standards on Copper and Copper Alloys.** 542 pages. Jan. 1951. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $4.35, paper; $5.00, cloth.

Includes 20 specifications on Cu, Cu alloys, and Cu-covered steel wire, rods, bars, and stranded conductors for electrical purposes; 13 specifications covering various nonferrous metals such as slab Zn, Ni, Si-Cu, Pb, and others; 62 specifications on various Cu and Cu-alloy products including plate, sheet, strip, wire, rods, bars, shapes, pipe and tubes, sand and die castings, arc welding electrodes, and brazing solder. Also includes ten test methods covering expansion, mercurous nitrate, resistivity, tension, micrographs, hardness, sampling, and grain-size evaluations. Finally, two recommended practices: preparing tension-test specimens of Cu-base alloys for sand castings; and designation of significant places in specified limiting values. (S22, Cu)

177-S. (Book) **ASTM Methods of Chemical Analysis of Metals.** 476 pages. 1950. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $6.50.

Greatly expanded over 1946 edition. Previous methods are supplemented by many new testing procedures. Metals and alloys covered include ferrous metals and alloys, ferro-alloys, Ni-Cr-Fe alloys, Ni and Ni-Cu alloys, Cu and Cu-base alloys, Al and Al-base alloys, Mg and Mg-base alloys, Pb, Sn, Sb and their alloys, silver solders, Zn and Zn-base alloys. (S11)

178-S. (Book) **A Bibliography of Statistical Quality Control—Supplement.** Grant I. Butterbaugh. 141 pages. University of Washington Press, Seattle 5, Wash. $2.00.

Supplement covers the period from 1946 to June 1949, and includes approximately 725 additional listings. The index is for both the original volume and the supplement. (S12)

179-S. (Pamphlet) **Radioactive Tracers in Metallurgical Research.** W. S. Eastwood, W. G. Marley, H. M. Finniston, and A. E. Williams. 1950, 55 pages. *Atomic Energy Research Establishment,* London, England.

Methods of producing isotopes and the nuclear processes by which they decay to a lower energy state. Methods for detection and counting nuclear changes. Use of tracers in metallurgy, especially in the study of diffusion. Control of health hazards from radioactive materials. 95 ref. (S19)

180-S. (Book) **Chemical Analyses of Cast Irons and Foundry Materials.** W. Westwood and A. Mayer. Over 550 pages. George Allen & Unwin, Ltd., Ruskin House, 40 Museum Street, London, W.C. 1, England. 42 s.

One of a series of manuals on foundry technology, edited by J. G. Pearce. Laboratory practice and apparatus; methods used for determination of 25 elements which can be present in cast iron. Sampling and analysis of iron ore, slags, sands and refractories, coke and coal dust; analysis of linseed oil. (S10, E general, CI)

181-S. (Pamphlet) **Normes, Japonaises Relatives aux Aciers et Alliages Utilisés dans l'Aviation Militaire et l'Aeronavale.** (Japanese Standards for Steels and Alloys used in Military and Naval Aircraft Construction). Centré de Documentation Sidérurgique, 6 rue de Lota, Paris (16), France. 11 tables (20 x 16 in.), 1950. 2000 francs.

Standards have been translated from Japanese into French in the form of an album. (S22)

182-S. A Simple Instrument for Evaluating Polished or Buffed Surfaces. G. E. Gardam. *Metal Finishing,* v. 49, Apr. 1951, p. 61-63.

The method consists of the inspection, under standard conditions, of the reflected image of a strongly illuminated pattern of light and dark stripes, and determination of the maximum distance between lamp and object at which the light and dark stripes can be separately distinguished. The result is broadly independent of the curvature of the surface, and can be applied to relatively non-reflective surfaces, or alternatively these can be increased in surface reflectivity. The same apparatus is useful as a general qualitative inspection tool for quality of polish, absence of major defects, and for absence of haze and bloom. (S15, L10)

183-S. Spectrochemical Analysis of Bismuth Matrices; Porous Electrode Technique. Joseph C. Delaney and Louis E. Owen. *Analytical Chemistry,* v. 23, Apr. 1951, p. 577-580.

Corrosion studies required a spectrochemical procedure for analysis of Bi and Pb-Bi eutectic matrices containing 0.0001-0.5% Be, Co, Cr, Fe, Mn, Mo, Cb, Ni, Ta, Ti, V, and/or W. Details of procedure developed. (S11, Bi)

184-S. Differential Spectrophotometric Determination of High Percentages of Nickel. Robert Bastian. *Analytical Chemistry,* v. 23, Apr. 1951, p. 580-586.

A procedure by which Ni is determined to about ±0.05% in several samples, including electronic Ni, spectrographic Ni, and synthetic mixtures containing Cu, Cr, Fe, and Co. (S11, Ni)

185-S. Spectrophotometric Determination of Tellurium as the Iodotellurite Complex. Ralph A. Johnson and Francis P. Kwan. *Analytical Chemistry,* v. 23, Apr. 1951, p. 651-653.

New method for trace determination of Te, which should find applications of interest in metallurgy, biological science, and industrial hygiene. (S11, Te)

186-S. Ultrasonic Flaw Detection in Pipes by Means of Shear Waves. C. D. Moriarty. *Transactions of the American Society of Mechanical Engineers,* v. 73, Apr. 1951, p. 225-229; disc. 229-235.

Apparatus and procedure together with some basic information by which applicability to general pipe inspection can be evaluated. (S13)

187-S. Ultrasonics — Metalworking Tool? Charles Emerson and John Starr. *American Machinist,* v. 95, Apr. 30, 1951, p. 85-88.

Present and potential applications. Main emphasis in present uses is on nondestructive testing. Other uses are ultrasonic soldering, honing, and cutting. Additional possibilities. (S13, K7, G17)

188-S. Increasing Combustion Efficiency in the Steel Industry. J. G. Sparks. *Iron and Steel Engineer,* v. 28, Apr. 1951, p. 89-94; disc. p. 94-96.

By continuously analyzing O_2, unburnt hydrocarbons, and fuel gases as combustion occurs, efficient control can be applied to the combustion process. (S18, ST)

189-S. Solid Sample Analysis With the Mass Spectrometer. *U. S. Atomic Energy Commission,* AECD-3040, Oct. 24, 1949, 11 pages.

The Consolidated-Nier isotope-ratio mass spectrometer was modified to permit an experimental study of its application to the continuous analysis of solid samples. Features and construction. (S11)

190-S. The Use of High Efficiency Gamma Counting in Conjunction With Beta Counting for Discrimination Between Thorium and Uranium. Robert H. Roethlisberger. *U. S. Atomic Energy Commission,* AECD-3062, Aug. 20, 1949, 13 pages.

The gamma-beta method of radiometric discrimination between Th and U was tested on 12 mineral samples. Radio-assays for ThO_2 and U_3O_8 were within a factor of 2 of the chemical analyses, and usually within 15%. (S10, S19, U, Th)

191-S. Spectrographic Study of Platinum and Palladium in Common Sulphides and Arsenides of the Sudbury District, Ontario. J. E. Hawley, C. L. Lewis, and W. J. Wark. *Economic Geology and the Bulletin of the Society of Economic Geologists,* v. 46, Mar.-Apr. 1951, p. 149-162.

Quantitative spectrographic technique developed to determine Pt and Pd in the common sulfides pyrite, pyrite; and in mixed arsenides, chief-pyrrhotite, pentlandite, and chalcoly niccolite, gersdorffite and maucherite, in ores of the Sudbury district. The method involves concentration by fire assaying and mixing the resulting beads with gold amalgam. Results of both qualitative and quantitative spectrographic analyses on various minerals. 15 ref. (S11, Pt, Pd)

192-S. Chromographic Contact Print Method of Examining Metallic Minerals and Its Application. David Williams and F. M. Nakhla. *Bulletin of the Institution of Mining and Metallurgy,* Apr. 1951; *Transactions,* v. 60, pt. 7, 1950-1951, p. 257-295.

The method serves mainly to determine the constituent elements of opaque metallic minerals in polished sections and in discrete grains. It localizes individual elements throughout the whole area of a polished surface and affords a rapid means of making complete qualitative analyses of metallic minerals, metals, and alloys. Describes simple contact-print method, also the electrographic modification, which is more rapid and provides prints of greater clarity and sharpness. Includes black-and-white and colored plates. (S11)

193-S. Progress in Gamma Radiography. *Atomics* (London), v. 2, Apr. 1951, p. 112-118.

Recent developments in equipment

and films for the nondestructive inspection of castings and welds. (S13)

194-S. Turbine-Blade Inspection. *Aircraft Production,* v. 13, Apr. 1951, p. 105-106.

Application of Sheffield Precionnaire pneumatic-unit gaging system. (S14)

195-S. Surface Finish Standards for Roughness, Waviness and Lay, as Adopted by the Department of Defense. T. E. Cassey and J. W. Sawyer. *Machine Design,* v. 23, May 1951, p. 137-140.

(S15)

196-S. Selection of Materials Must be Guided by More Than Conventional Tests and Data. H. W. Gillett. *Machine Design,* v. 23, May 1951, p. 154-158.

Based on a new book by the late Dr. Gillett. Some topics discussed are: service conditions; effects of design on behavior; combination of requirements; question of ductility; factors in selection; tests and specifications; and limitations set by conventional tests. 21 ref. (S22)

197-S. Die-Cast Rotor Studies. L. C. Packer and G. E. Monchamp. *Electrical Engineering,* v. 70, May 1951, p. 389. (A condensation.)

Die-cast rotors have many advantages over Cu cage rotors for induction motors, but they also have more possible defects, because of the nature of the process. Nondestructive test equipment utilizing an oscilloscope. (S13, Cu)

198-S. Metallurgical Activities at Aberdeen Proving Ground. *Metal Progress,* v. 59, Apr. 1951, p. 499-502.

Laboratory and field testing procedures for gun tubes, armor and projectiles. (S21, T2)

199-S. Metal Failures in Aircraft. W. B. F. Mackay and R. L. Dowdell. *Metal Progress,* v. 59, Apr. 1951, p. 518-522.

Various examples such as exhaust systems, sheet metal work, torquing of bolts and studs, engine mounts, and welded joints and suggested failure-control methods. (S21, T24)

200-S. Continuous Gas Analyzer Serves High-Pressure Stack. John de Piccolellis. *Steel,* v. 128, May 7, 1951, pg. 136, 138.

Use of thermal-conductivity type of instrument for continuous analysis of blast-furnace top gas. Includes high-H_2 alarm to give immediate warning of cut tuyeres, cooling plates, or other failures, which could introduce water directly into the furnace. (S11, D1, ST)

201-S. Light Metal Extrusion Die Pool for Aircraft Industry. *Light Metal Age,* v. 9, Apr. 1951, p. 11.

New program recently announced by the Air Materiel Command, USAF, Supply Div., represents an industry and Government agreement and is in effect a national aircraft-extrusion-die pool. The program is designed to eliminate bottlenecks in the aircraft and Al and Mg extrusion industries. It will provide a step toward standardization of extrusion dies and specifications used in the manufacture of aircraft for the U. S. Government, and prevent future duplication of such dies. (S22, F24, Al, Mg)

202-S. Photocolorimetric Method for the Analysis of Nickel in Nickel Plating Baths. Gilbert C. H. Stone. *Metal Finishing,* v. 49, Feb. 1951, p. 44-48.

Possible effect of other ions apt to be present in Ni baths on accuracy of the Ni determination was also investigated. Maximum error introduced did not exceed 3%. 12 ref. (S11, L17, Ni)

203-S. Visual and Optical Evaluation of Metal Surfaces. Helmut Thielsch. *Metal Finishing,* v. 49, May 1951, p. 54-61.

Second of a series on fundamentals of surface measurement. Classification of optical procedures. Microscopic examination, replica techniques, electron-microscope methods, sectioning methods, and interferometric studies. 15 ref. (S15)

204-S. Determination of Impurities in Electroplating Solutions. XXI. Traces of Pb in Zn Plating Baths. Earl J. Serfass and Mary H. Perry. *Plating,* v. 38, May 1951, p. 473-476.

Pb is separated from interfering ions by extraction with a CCl_4 solution of dithizone in the presence of KCN. After removal of excess dithizone with alkaline KCN, transmittance of the CCl_4 solution is measured and quantity of Pb present determined from a calibration curve. (S11, L17, Zn, Pb)

205-S. Dimensional Checking and Pressure Testing of Gray Iron Castings. Kenneth M. Smith. *American Foundrymen's Society,* Preprint 51-14, Apr. 1951, 5 pages.

Equipment used. (S14, CI)

206-S. Choosing Equipment for Nondestructive Testing. Carlton H. Hastings. *American Foundrymen's Society,* Preprint 51-15, Apr. 1951, 6 pages.

Four principal tests; radiography, magnetic-particle tests, penetrant tests, and ultrasonic or acoustical tests. Applicability of these methods and of nondestructive tests in general, with regard to the choice of test equipment. (S13)

207-S. A Method of Measuring Local Internal Temperatures in Solids. H. Dean Baker and E. A. Ryder. *American Society of Mechanical Engineers,* Paper 50-A-101, 1950, 9 pages.

Thermocouple technique subjected to laboratory tests, as well as to extensive service under industrial operating conditions. (S16)

208-S. Inspection, Processing, and Manufacturing Control of Metals by Ultrasonic Methods. Carlton H. Hastings and Seymour W. Carter. *American Society for Testing Materials,* "Symposium on Ultrasonic Testing", 1951, p. 14-61.

Summarizes available technical literature through 1946 on the subject of ultrasonics as applied to metals. Emphasizes detection of flaws. 342 ref. (S13)

209-S. Basic Principles of Practical Ultrasonic Testing. John C. Smack. *American Society for Testing Materials,* "Symposium on Ultrasonic Testing", 1951, p. 62-71.

Progress in instrumentation, available equipment, principles of operation, and applications, including setting up of test standards. (S13)

210-S. Ultrasonics in the Heavy Forgings Industry. James C. Hartley. *American Society for Testing Materials,* "Symposium on Ultrasonic Testing", 1951, p. 72-83.

Application of nondestructive ultrasonic testing in the forging field. (S13, F22, ST)

211-S. The Application of Ultrasonics to the Fabrication of Aluminum. J. V. Carroll. *American Society for Testing Materials,* "Symposium on Ultrasonic Testing", 1951, p. 84-86.

Use of nondestructive ultrasonic tests with a Reflectoscope for determination of internal soundness of Al ingots, forging stock, forgings, and large rolled shapes. (S13, Al)

212-S. Ultrasonic Testing in Railroad Work. E. D. Hall. *American Society for Testing Materials,* "Symposium on Ultrasonic Testing", 1951, p. 87-89.

Experiences in testing locomotive axles with a Reflectoscope, to locate cracks. (S13, T23)

213-S. Ultrasonics in the Electrical Industry. D. M. Kelman. *American Society for Testing Materials,* "Symposium on Ultrasonic Testing", 1951, p. 90-101.

Testing of large steel forgings used in turbogenerator rotors. (S13, T25, ST)

214-S. Ultrasonic Testing of Bronze Forgings and Ingots. A. Piltch. *American Society for Testing Materials,* "Symposium on Ultrasonic Testing", 1951, p. 102-103.

Experience of the Naval Gun Factory in the use of the Sperry Reflectoscope. (S13, Cu)

215-S. Crankshaft Bearing Failures. P. H. Smith. *Australasian Engineer,* v. 44, Mar. 7, 1951, p. 68-69.

Influence of increased bearing clearances and higher lubricating oil pressures. (S21, SG-c)

216-S. Radiography of Welded Joints for Power Plants. J. H. Lawson. *Australasian Engineer,* v. 44, Feb. 7, 1951, p. 78-82.

Equipment and procedures. (S13)

217-S. The Inspector's Approach to Arc Welding. C. W. Ephithite. *Australasian Engineer,* v. 44, Mar. 7, 1951, p. 79-83, 103.

The inspector's program is outlined and reference made to the various types of joint and the kind of defects likely to be encountered. (S13, K1)

218-S. Some Applications of Interferometry to the Examination of an Electrodeposited Film. S. Tolansky. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, 8 pages. (Advance Copy 6.)

How multiple-beam interferometry can offer a means of studying electrodeposits. One variety of multiple-beam interference, and its use in determining surface contour, hardness indentations, thickness of deposit, and characteristics of a Sn-Ni deposit. (S15, S14, Sn, Ni)

219-S. Inorganic Chromatography on Cellulose; Some Applications to the Analysis of Nickel Plating Baths. F. H. Burstall, N. F. Kember, and R. A. Wells. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, 12 pages. (Advance Copy 11.)

A cellulose column separation process which enables a number of metals to be extracted together from a nickel plating solution. Gives previous methods and results of experiments. (S11, L17, Ni)

220-S. From a Metallurgist's Notebook: Stressed Brass Bases. H. H. Symonds. *Metal Industry,* v. 78, Apr. 27, 1951, p. 350.

Absence of any significant corrosion on brass lipstick bases which showed cracking in the walls ruled out the possibility that this failure was due to season-cracking. Results of examination indicate that the failure was due to stress cracking brought about by conditions which included hardness of the metal, circumferential tensile stresses in the walls, and pitted nature of the surface. Includes micrographs. (S21, Q27, Q29, Cu)

221-S. Production Problems. IV. Prematurely Broken Crankshaft. *Iron*

and Steel, v. 24, May 1951, p. 179-180.
Examination of fractured steel crankshaft. Data, observations, and conclusions as to cause of failure. (S21, CN)

222-S. Spectrographic Determination of Aluminum, Zinc, and Silicon in Magnesium Alloys Containing 90% Mg. (In French.) Jean-Pierre Puenzieux. *Helvetica Chimica Acta,* v. 34, Mar. 15, 1951, p. 615-628.
An improved method characterized by rapidity, precision, and simplicity. Optimum conditions of operation and technique of determination. Typical data. (S11, Mg)

223-S. New Instruments for Magnetic Nondestructive Testing. (In German.) Werner Jellinghaus. *Archiv für das Eisenhüttenwesen,* v. 22, Mar.-Apr. 1951, p. 111-115.
Design and operation of three German instruments. (S13)

224-S. Certain Results of Investigation of the Surface Quality of Machine Parts. (In Russian.) P. E. D'yachenko. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Jan. 1951, p. 22-28.
Investigation undertaken to establish criteria for evaluation of surface microgeometry due to different kinds of cold working. Methods of evaluating three basic parameters most strongly influencing surface quality (roughness of the cutting edge, roughness of the tool, and radius of the cutting edge). Other factors influencing surface nonuniformity were also studied. Devices for determination of surface quality and fields of applicability. (S15)

225-S. A New Nondestructive Test for Corrosion-Fatigue Cracks in Drill Pipe. S. A. Wenk and H. M. Banta. *Oil and Gas Journal,* v. 50, May 17, 1951, p. 90-92, 125-126.
"Magnaglo" dry, fluorescent, magnetic powder and technique for interior inspection of tubular products. Practical information on use of the method in the field. (S13, R1, ST)

226-S. Improvements in Metallurgy and Design Reduce Failures of Drill String Tools. Frank Briggs. *Petroleum Engineer,* v. 23, May 1951, p. B7-B10, B12.
Contributions of metallurgy and design to the problem. Includes micrographs and macrographs. (S21, T28, AY)

227-S. Research Attack on the Shelly-Rail Problem. L. S. Crane. *Railway Engineering and Maintenance,* v. 47, May 1951, p. 441-443.
The wide incidence of the rail defect known as "shelly spots" comprises one of the most perplexing rail-failure problems facing the railroads today. In an effort to find a remedy for this condition, a large amount of research has been carried out on a broad front. Nature of this research and results to date. (S21, T23, CN)

228-S. Utilization of Ultrasonics in Control of Welding. (In French.) P. Bontron. *Soudure et Techniques Connexes,* v. 4, Nov.-Dec. 1950, p. 229-237; disc., p. 237-239, 247.
Three methods, with preference given to a resonance method. Development of a code for correlating oscillograph patterns and corresponding defects. (S13, K general)

229-S. (Book) **Standard Methods of Analysis of Iron, Steel, and Ferro-Alloys.** Ed. 4. 170 pages. 1950. United Steel Companies, Ltd., Publications Dept., 17 Westbourne Rd., Sheffield 10, England. 17 s., 6 d.
Includes developments in methods and technique since the 3rd edition (1945). The major addition is a new section dealing with physicochemical techniques, such as absorptiometric and polarographic methods. (S11, Fe, ST)

230-S. (Book) **Metal Spectroscopy.** F. Twyman. 569 pages. 1951. Charles Griffin and Co. Ltd., 42 Drury Lane, London, W.C. 2, England. 50s.
A new edition of "Spectrochemical Analysis of Metals" (1941) but with a considerable amount of additional matter. Scope has been enlarged to include descriptions of absorptiometric methods in the ultra-violet and infrared, X-ray diffraction methods, and some particulars of chromatographic separations. (S11)

231-S. (Book) **Symposium on Ultrasonic Testing.** 133 pages. 1951. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. (Special Technical Publication No. 101.)
Includes 10 papers by different authors, an introduction, and general discussion. Pertinent papers are abstracted separately. (S13)

232-S. (Pamphlet) **Bibliography on Industrial Radiology.** 3rd Supplement. Herbert R. Isenburger. 19 pages, 1951. St. John X-Ray Laboratory, Califon, N. J. $2.00.
Covers years 1948-50. (S13)

233-S. Methods for Sorting Mixed Metals. Antony Doschek. *Instruments,* v. 24, May 1951, p. 522-527, 568, 570.
The methods and instruments discussed are primarily sorting tools. When used as tools to expedite the sorting of the occasional mixup or as production-control equipments, they can be relied upon to discrim-

inate against unwanted conditions only after a thorough study of their behavior has been made through measurements, not only of "acceptable" and "unacceptable" representative standards, but also of standards which lie between, and outside of, extremes of the problem. (S10)

234-S. Operation and Maintenance of Electronically Operated Instrument Equipment. John R. Green. *Iron and Steel Engineer,* v. 28, May 1951, p. 102-107.

Emphasis on steel-plant applications. (S16, S18)

235-S. X-Ray Spectrometer Measures Tin Coating. *Steel Equipment & Maintenance News,* v. 4, May 1951, p. 16-17.

Units are available for checking plating on one side of a sheet at a time or on both sides simultaneously. Time required to effect a point check is approximately ½ min. Thicknesses ranging from 10 micro-in. can be determined within 2%, and over-all sensitivity is such that coatings as thin as 1 micro-in. are detectable. (S14, Sn)

236-S. Processing Metals With Atomic Energy. Thomas A. Dickinson. *Steel Processing,* v. 37, May 1951, p. 221-225, 257.

Use of radioactive isotopes or tracers in investigation of a wide variety of metallurgical and metalworking problems. 16 ref. (S19)

237-S. Prediction and Production of Springs by Statistical Quality Control. Ervin E. Schiesel. *Wire and Wire Products,* v. 26, May 1951, p. 385-388.

Main steps controlled are load testing, coiling, heat treating, and plating. Material is not indicated. (S12, 17)

238-S. From a Metallurgist's Notebook: Cracked Kettle Bodies. H. H. Symonds. *Metal Industry,* v. 78, May 11, 1951, p. 389.

Preliminary examination of cracking in brass kettle bodies showed that there was tarnishing both inside and out. Further examination revealed that cracking was due to the period of time during which the spinnings were kept in stock under unsatisfactory conditions. (S21, Cu)

239-S. Nondestructive Testing of Defective Bimetallic Joints and of Laps in Thin Sheet Metals. (In Dutch.) J. Van Nieuwkoop. *Metalen,* v. 6, Apr. 15, 1951, p. 110-112.

Apparatus especially designed for nondestructive examination of sheet metals for discontinuities and of thin parts for defects in joints. Possibilities and limitations of the apparatus. (S13)

240-S. Development, Present State, and Outlook of Spot Test Analysis. (In English.) Fritz Feigl and Philip W. West. *Mikrochemie vereinigt mit Mikrochimica Acta,* v. 36-37, pt. 1, Jan. 4, 1951, p. 191-205.

Previously abstracted from *American Society for Testing Materials,* "Symposium on Rapid Methods for the Identification of Metals," 1950. See item 156-S, 1951. (S10)

241-S. Methods of Preliminary Concentration Before Spectrochemical Determination of Trace Elements. (In French.) F. Burriel-Marti and J. Ramirez-Munoz. *Mikrochemie vereinigt mit Mikrochimica Acta,* v. 36-37, pt. 1, Jan. 4, 1951, p. 495-512.

Reviews the methods and their application to determination of small quantities of Bi in ternary Pb-rich alloys and to determination of Ba. 21 ref. (S11, Pb)

242-S. A Micromethod for Quantitative Spectrographic Analysis of Archeological Bronzes. (In French.) M. Van Doorselae. *Mikrochemie vereinigt mit Mikrochimica Acta,* v. 36-37, pt. 1, Jan. 4, 1951, p. 513-521.

14 references. (S11, Cu)

243-S. Nondestructive Testing of Large Forgings by Means of Ultrasonics. (In German.) W. Felix. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, Apr. 1951, p. 107-113.

Metallographic tests prove the adequacy and accuracy of the method. (S13)

244-S. Spectrographic Analysis of Uranium. (In English.) A. Walsh. *Spectrochimica Acta,* v. 4, No. 1, 1950, p. 47-56.

Tentative method for spectrographic determination of impurities in uranium. Estimates of degree of accuracy and sensitivity obtainable. All the quantitative data so far available are limited to determination of Fe, Si, Mn, Cu and Ni, but it is anticipated that the technique will be applicable to other impurities. Suggestions for further improvement of the method. (S11, U)

245-S. Photoelectric Intensity Measurements in the Iron Arc. (In English.) H. M. Crosswhite. *Spectrochimica Acta,* v. 4, No. 2, 1950, p. 122-151.

Techniques which permit measurement of spectral intensities in general with an accuracy of better than 1%, using multiplier phototubes and a recently developed electronic ratio recorder. As a particular application, relative intensities of over 1000 lines from a standard d.c. iron arc were measured. Quantitative data are also given for self-absorption and variation of intensities with excitation conditions. (S11, Fe)

246-S. A Graphical Method for Evaluating Spectrochemical-Alloy Samples Which Contain Three Components. (In German.) A. Keil. *Spectrochimica Acta*, v. 4, No. 2, 1950, p. 165-166. (S11)

247-S. The Spectrographic Analysis of Uranium in Uranium Ores. (In English.) A. Strasheim. *Spectrochimica Acta*, v. 4, No. 3, 1950, p. 200-211.

Three methods are: direct evaporation of the sample with graphite as arc stabilizer in a d.c. arc; prior extraction of U from the ores before the analysis; and direct burning of the sample in a d.c. arc with an enhancing agent. Sensitivities and accuracies of the methods indicate that U contents as low as 0.006% U_3O_8 can be analyzed directly, according to the 3rd procedure, with an accuracy of 11%. 10 ref. (S11, U)

248-S. Identification Lines for Spectral Analysis of Platinum-Rhodium Alloys. (In German.) Wolfgang Koehler. *Spectrochimica Acta*, v. 4, No. 3, 1950, p. 229-232.

Technique for determining trace impurities in Pt-Rh alloys using spark and also interrupted-arc spectra between small foil samples. A list of lines likely to interfere with the most sensitive lines of the impurities is given. (S11, Pt, Rh)

249-S. Quality Control in the Steel Plant by Means of Large-Scale Investigations. (In German.) Karl Daeves. *Stahl und Eisen*, v. 71, Apr. 26, 1951, p. 430-433.

Frequency analyses for S, P, and N, as well as the analysis of American electric-furnace scrap for Cr and Cu show a log-normal distribution as evidence of high quality. Proposes this sort of analysis as a method of quality control and comparison of different steel plants. (S12, ST)

250-S. Status and Development of Heat Treatable Steels. (In German.) Heinz Kiessler. *Stahl und Eisen*, v. 71, Apr. 26, 1951, p. 433-440.

Definition, requirements, and testing methods are followed by a discussion of changes in compositions of heat treatable steels in Germany since 1925 and of the classes and mechanical properties of steels of the new Standard DIN 17,200. This standard is compared with American, French, and English standards. (S22, ST)

251-S. Practical Materials Testing by Means of Ultrasonics. (In German.) H. Krautkrämer and J. Krautkrämer. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 93, May 1, 1951, p. 349-362.

Theory, practice, and applications. Numerous photographs, diagrams, and tabulated data. 18 ref. (S13)

252-S. Noncontacting Thickness Gages for Flat Rolled Steel Products. W. A. Black. *American Iron and Steel Institute*, Preprint, 1951, 35 pages.

Manner and results of use of X-ray and Beta-ray gages for the flat rolled products. Technical descriptions are simplified and expressed in nontechnical language in order to focus attention on actual performance and operating experience. Theoretical possibilities are given only minor consideration. (S14, ST)

253-S. Materials Handling for Bulk Sampling. Joseph Manuele. *American Society for Testing Materials*, Preprint 121, 1951, 4 pages.

It is desirable to have some means of evaluating the average quality of products handled in bulk, within relatively close limits. Explores methods of handling bulk materials in order to permit sampling for determining this average quality. (S12)

254-S. Sampling of Ferrous and Non-Ferrous Alloys—A Bibliography. Albert C. Holler, chairman. *ASTM Bulletin*, May 1951, p. 66-67.

52 references. (S12)

255-S. Apparatus for Differential Thermal Analysis. Duncan McConnell and J. W. Earley. *Journal of the American Ceramic Society*, v. 34, June 1, 1951, p. 183-187.

Newly designed, automatic, recording equipment which has been combined with temperature-control apparatus, Pt—Pt+10% Rh thermocouples, a Globar furnace, and a newly designed sample holder, for simultaneous production of 3 thermograms (differential-thermal-analysis curves). The apparatus can be employed safely for temperatures up to 1100° C. Complex interrelationships between the recording and control circuits. (S16, M23)

256-S. Direct-Reading Spectrograph is Faster, More Accurate. B. J. Tufty. *Iron Age*, v. 167, June 7, 1951, p. 104-105.

As the spectrum line of each component in an alloy is evaluated, the new French spectrograph described gives a direct reading as well as a printed record on a calibrated drum chart. Photoelectric cells replace the usual photographic plate. (S11)

257-S. Instrumentation in Steelmaking. R. A. Lambert. *Metal Progress*, v. 59, May 1951, p. 657-659.

Report on papers on openhearth production instrumentation presented at Mar. 1951 regional conference of the Pittsburgh section of the Instrument Society of America. (S16, S18, D2, ST)

258-S. Variables Encountered in Tracer Experiments in Metallurgy. C. Dean Starr, John R. Lewis, and Thomas J. Parmley. *Metal Progress,* v. 59, May 1951, p. 673-680.

Variables are examined under various conditions to determine the accuracy necessary to obtain reproducible results. 10 ref. (S19)

259-S. What Causes Tubular Failures? D. C. Neely. *Oil and Gas Journal,* v. 50, May 31, 1951, pt. 1, p. 78-80, 116.

A few typical examples of casing and drill-pipe failures. Possible causes and remedies. (S21, T28, ST)

260-S. Navy Considers Hull Plate Specification Changes. J. E. Walker. *Steel,* v. 128, June 11, 1951, p. 89.

Summarizes proposed changes. (S22, CN)

261-S. Chemical Determination of Thorium in Ores. John C. Ingles. *Canadian Chemistry and Process Industries,* v. 35, May 1951, p. 397-398, 400, 402, 404, 406.

Various methods for separation of Th from ores and rare earths. A procedure is recommended for determination of Th in ores. 11 ref. (S11, Th)

262-S. Improvements in the Design of Ultrasonic Lamination Detection Equipment. H. R. Clayton and R. S. Young. *Journal of Scientific Instruments,* v. 28, May 1951, p. 129-132.

Development of an apparatus for detection of lamination on Al blanks and sheet. Transmission technique used by Sokolov was modified in order to minimize the effect of standing waves which are formed in sheets of specific thicknesses. Tests show that a defect less than ¾ in. diam. can be detected and that contours of a lamination can be traced with a satisfactory accuracy. (S13, Al)

263-S. Spectrographic Determination of Magnesium in Nodular Cast Iron. (In German.) O. Werner. *Giesserei,* v. 38 (new ser., v. 4), May 17, 1951, p. 232-233.

Two methods proposed by T. J. Hugo, and claimed to be more reliable, simpler, and less time-consuming than earlier methods. (S11, CI)

264-S. Isotopes in Metal Fabrication. C. B. Fergusson. *Metal Industry,* v. 78, June 1, 1951, p. 439-441.

A case in which extensive use was made of radon for the examination of welds on a number of heavy vessels recently manufactured for an oil company. (S19, ST)

265-S. From a Metallurgist's Notebook: Cast Letter Plates. H. H. Symonds. *Metal Industry,* v. 78, June 1, 1951, p. 447-448.

Investigation concerned with surface defects in cast brass and gunmetal letter plates. The investigation included visits to the foundry to check casting conditions where a number of modifications were tried with little success. (S13, E11, Cu)

266-S. Colorimetric Determination of Iron; A Review of Known Methods. I. T. S. West. *Metallurgia,* v. 43, Apr. 1951, p. 204-206; May 1951, p. 260-261, 263-264.

81 references. (S11, Fe)

267-S. Determination of the Thickness of Thin Layers Obtained by Condensation of Synthetic Radioactive Elements. (In French.) Marcel Devienne. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Mar. 12, 1951, p. 1088-1089.

A method particularly suitable to radioactive substances. Radioactivity of the layer is measured and compared with that of a standard layer of the same material. Application experiment to radioactive antimony. Thicknesses used were usually less than 1000 Å. (S14, S19)

268-S. Nondestructive Testing of Materials. Study of Liquation. (In French.) H. de Leiris. *Métaux Corrosion—Industries,* v. 26, Jan. 1951, p. 22-28.

Method in which drops of liquids based on tetralin, propyl alcohol, or xylene, are placed on the surfaces of materials to be examined under the microscope, revealing the location and character of surface defects. (S13)

269-S. (Book) 1950 Supplement to Book of ASTM Standards Including Tentatives. Part I. Ferrous Metals. 316 pages. 1951. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. (S22, Fe)

270-S. Aluminum-Coil Weight and Length. *American Machinist,* v. 95, June 25, 1951, p. 143.

Nomograms facilitate calculation. (S22, Al)

271-S. Report of Committee A-1 on Steel. N. L. Mochel, chairman. *American Society for Testing Materials,* Preprint 2, 1951, 56 pages.

Recommendations affecting standards on steel; proposed tentative specifications for Ni-Cr-Mo steel bars for springs, for alloy steel seamless drum forgings, for seamless and welded steel tubes for low temperature service, for carbon steel sheets of flange and firebox qualities, and for seamless ferritic alloy-steel pipe for high-temperature service. (S22, CN, AY)

272-S. Report of Committee A-3 on Cast Iron. J. S. Vanick, chairman. *American Society for Testing Materials,* Preprint 3, 1951, 8 pages.

Proposed revised tentative specifications for gray iron castings for pressure-containing parts for temperatures up to 650° F. (S22, CI)

273-S. Report of Committee B-1 on Wires for Electrical Conductors. D. Halloran, chairman. *American Society for Testing Materials,* Preprint 7, 1951, 22 pages.

Proposed tentative specifications for tinned hard-drawn and medium-hard-drawn Cu wire for electrical purposes, and for hard-drawn Cu wire. (S22, T1, Cu)

274-S. Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. G. H. Harnden, chairman. *American Society for Testing Materials,* Preprint 10, 1951, 29 pages.

Recommendations affecting standards for Cu and Cu alloys, cast and wrought; proposed revised standard specifications for steam or valve bronze castings and for composition brass or ounce metal castings; also proposed revised standard mercurous nitrate test for Cu and Cu alloys. (S22, Cu)

275-S. A Basic Guide for Management's Choice of Non-Destructive Tests. Robert C. McMaster and Samuel A. Wenk. *American Society for Testing Materials,* "Symposium on the Role of Non-Destructive Testing in the Economics of Production," 1951, p. 3-80; disc., p. 81-82.

Basic principles and essential parts of nondestructive tests and the significant features of 12 basic test methods described in more than 250 patents and about 500 technical articles. Features of nondestructive tests with reference to existing commercial instruments, and principle of operation of each test method; novel features and applications of the significant patents. Lists references and patents. (S13)

276-S. Discontinuities in Cast and Wrought Products That Can Be Revealed by Non-Destructive Tests. Kent R. Van Horn. *American Society for Testing Materials,* "Symposium on the Role of Non-Destructive Testing in the Economics of Production," 1951, p. 83-100; disc. p. 100-101.

The sensitivity limitations and important applications for four extensively used nondestructive tests—radiographic, fluorescent-penetrant, magnetic-particle, and ultrasonic methods. Discontinuities listed in the ASTM terminology that are likely to be detected in nonferrous and ferrous castings and welds by these tests. Discontinuities that may be revealed in wrought products. (S13, Mg, Al, Fe, ST)

277-S. The Role of Non-Destructive Testing in the Economics of Castings. John W. Juppenlatz. *American Society for Testing Materials,* "Symposium on the Role of Non-Destructive Testing in the Economics of Production," 1951, p. 102-108; disc., p. 109-111.

Need for testing, destructive vs. nondestructive testing, importance of design, specifications, and interpretation of nondestructive tests. (S13, E general)

278-S. The Economics and Practical Application of Cobalt 60 in the Radiographic Inspection of Steel Weldments. W. L. Schwinn. *American Society for Testing Materials,* "Symposium on the Role of Non-Destructive Testing in the Economics of Production," 1951, p. 112-131; disc., p. 132-135.

The industrial application of Co-60 in the inspection of steel weldments was investigated by means of a comparison of radiographs taken with this source and with X-rays and gamma rays. Sensitivity charts demonstrate not only relative sensitivity but also the technique required, the economics, and exposure times. These studies indicate that, in certain applications, Co-60 is superior to radium. (S13, Co, ST)

279-S. The Economics of Wrought Steel Inspection. C. D. Moriarity. *American Society for Testing Materials,* "Symposium on the Role of Non-Destructive Testing in the Economics of Production," 1951, p. 136-144; disc. p. 145-147.

The economic value of nondestructive testing to the wrought-steel user. The part ultrasonics and the testing of material in motion has in the saving of man hours. (S13, ST)

280-S. Management's Responsibility for Insistence on Non-Destructive Testing in the Development of New Engineering Products and Processes. Leslie W. Ball. *American Society for Testing Materials,* "Symposium on the Role of Non-Destructive Testing in the Economics of Production," 1951, p. 148-151; disc., p. 152. (S13)

281-S. Spectrophotometric Determination of Nickel in Steel. M. D. Cooper. *Analytical Chemistry,* v. 23, June 1951, p. 875-880.

Range of ratios of Mn and Cu to Ni which can be tolerated in the sample solution, and a simple method of correcting for the interference. The retarding effect of Mn on color development may lead to serious error in determination of Ni at trace

levels in steel. Comparative data show that this spectrophotometric method is superior to gravimetric and titrimetric methods from the standpoint of precision as well as speed. 11 ref. (S11, Ni, ST)

282-S. Spectrophotometric Determination of Nickel in Aluminum Alloys. M. D. Cooper. *Analytical Chemistry,* v. 23, June 1951, p. 880-883.

Two methods, which differ with respect to the method of removing Cu, and a third method with satisfactory precision for routine analysis. (S11, Ni, Al)

283-S. Ultraviolet Spectrophotometric Determination of Vanadium. George Telep and D. F. Boltz. *Analytical Chemistry,* v. 23, June 1951, p. 901-903.

General procedure developed is suitable for determination of 0 to 125 p.p.m. of V and should be applicable to a variety of samples. (S11, V)

284-S. Modified Vacuum Fusion Apparatus for Determination of Oxygen, Hydrogen, and Nitrogen in Certain Metals. A. F. Torrisi and Jean L. Kernahan. *Analytical Chemistry,* v. 23, June 1951, p. 928-929.

Apparatus has been modified to increase its rate of output. (S11)

285-S. Radioisotopes in Industry. G. D. Calkins. *Chemical and Engineering News,* v. 29, June 18, 1951, p. 2456-2459.

Applications in numerous branches of science and technology. Present status and future prospects, and reasons which have caused hesitation on the part of industry in organizing programs for utilizing radioisotopes. 43 ref. (S19)

286-S. Gamma-Ray Tests of Pipe Welds. Alexander Gobus. *Combustion,* v. 22, June 1951, p. 45-48.

Procedure employed in examination of field welds by means of radiography with gamma rays. Necessary precautions. (S13)

287-S. Pneumatic Servomechanisms in the Iron and Steel Industry. A. A. Markson. *Instruments,* v. 24, June 1951, p. 647-649, 690-691.

Advantages and limitations of air as a control fluid in a servomechanism. Transmission factors associated with pneumatic signals, including pressure range and speed of transmission. Typical oil-operated and air-operated servomechanisms for controlling the heavy damper of a furnace, together with relative advantages and disadvantages of each type. Design problems for air-operated power units. (S18, ST)

288-S. Hydraulic Servocontrols in the Steel Industry. H. Ziebolz. *Instruments,* v. 24, June 1951, p. 650-651, 689-691.

Advantages and disadvantages of hydraulic servo systems and a method for obtaining proportional-plus-reset control with a hydraulic system. (S18, ST)

289-S. Non-Contact Gaging. J. T. Welch. *Instruments,* v. 24, June 1951, p. 652-654, 691.

The X-ray gage for measuring the thickness of continuous strip, and the air gage for measuring the thickness of fabricated parts. Principles, construction details, and numerous applications. (S14)

290-S. Radiographic Inspection of Steel Castings. John M. Flanagan. *Instruments,* v. 24, June 1951, p. 655, 688-689.

History of the method. Compares various radiographic methods in general use. Importance of contracts and specifications in radiographic inspection. (S13, CI)

291-S. Instruments Unsnarl Metal Mixups. Antony Doschek. *Iron Age,* v. 167, June 21, 1951, p. 92-96.

See abstract of "Methods for Sorting Mixed Metals," *Instruments,* item 233-S, 1951. (S10)

292-S. Identification of 3 Stainless Alloys Simplified. A. W. Smolla. *Iron Age,* v. 167, June 21, 1951, p. 97-98.

Limitations of the available electrical systems are by-passed by a qualitative chemical method for identifying Types 316, 321, and 347 stainless. Side trim or end scrap is used and only beakers, chemicals, and heat are required for identification. (S11, SS)

293-S. New Magnetic Particle Testing Technique Speeds Inspection of Ferrous Parts. S. G. Kelley, Jr. *Materials & Methods,* v. 33, June 1951, p. 66-68.

Modified method which detects surface defects occurring in any direction in one operation. (S13)

294-S. "Standard" Size and Grade Die Sections Established for Sintered Carbides. E. J. Reitler. *Modern Industrial Press,* v. 13, June 1951, p. 24, 26, 28.

New standards apply to a wide range of sizes for punches, perforators, pilots, bushings and rectangular sections. They are supplied in a "universal" grade of sintered carbide. (S22)

295-S. Analysis of Solids in the Mass Spectrometer. *Technical News Bulletin* (National Bureau of Standards), v. 35, June 1951, p. 84-86. (Condensed from paper by J. G. Gorman, E. J. Jones, and J. A. Hipple, *Analytical Chemistry,* v. 23, Mar. 1951, p. 438-440.)

A method of compensating for

fluctuation in the source is illustrated by determination of Ni and Cr content of six stainless steels. The results agree well with the composition determined chemically. This initial success indicates that the mass spectrometer should find wide application in the routine, rapid analysis of solids. (S11, SS)

296-S. From a Metallurgist's Notebook: Plated Coil Springs. H. H. Symonds. *Metal Industry,* v. 78, June 8, 1951, p. 469.

Isolated intergranular films of oxide were found to be the cause of cracking in Ag-plated brass coil springs submitted for examination. (S21, Q26, Ag, Cu)

297-S. Comparative Study of Results Obtained by Reduction Melting Under Vacuum and by Gotta's Process. (In French.) J. Varetto and L. Lacomble. *Revue Universelle des Mines, de la Métallurgie des Travaux Publics, des Sciences et des arts appliques a l'Industrie,* v. 94, Feb. 1951, p. 70-73.

For determination of total O_2 in steel, ie., reduction fusion under vacuum and cementation using Al, or Gotta's method. Emphasizes particularly the difficulties encountered; also sources of error and methods for their minimization. (S11, ST)

298-S. Spectrographic Determination of Impurities in Zinc and Its Alloys. (In Polish.) W. Klimecki and J. Kurylowicz. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 2, 1951, p. 97-114.

Results of extensive investigation for various impurities. Recommended procedures. 13 ref. (S11, Zn)

299-S. The Spectrographic Determination of Uranium in Ores and Ore Products. David Kaufman and Carl W. Perkins, Jr. *U. S. Atomic Energy Commission,* AECD-2834, Aug. 25, 1948, 19 pages.

A d.c. arc was used for excitation. Direct burning of a 10-mg. sample, simple chemical concentration procedures, separation of U by ether extraction, and selective volatilization of U as fluoride were unsuccessful. By the addition of AgCl, most of the material was volatilized in a preburning period, and the U, which was not volatilized, was accurately determined down to 0.05% U_3O_8 on what was left. (S11, U)

300-S. Electro Magnetic Wire Rope Tester. (In English.) Masashi Naito. *Bulletin of the Electrotechnical Laboratory* (Japan), special no., Mar. 1950, p. 37-43.

Principles of the test method, construction of the apparatus, and typical test data. (S13)

301-S. Chromographic Contact Print Method of Examining Metallic Minerals and Its Applications. *Bulletin of the Institution of Mining and Metallurgy,* June 1951; *Transactions,* v. 60, pt. 9, 1950-51, p. 389-399.

Discusses above paper by David Williams and F. M. Nakhla (see item 192-S, Apr. 1951 issue). (S11)

302-S. Metal Wall Thickness Measurement From One Side by the Ultrasonic Method. N. G. Branson. *Electrical Engineering,* v. 70, July 1951, p. 619-623.

Principles of method and an instrument for making such measurements. Selection of quartz crystals and range, accuracy and limitations of the method. (S14)

303-S. A Magnetic Method for Measuring the Temperature of Moving Wires. A. Moles. *Engineers' Digest,* v. 12, June 1951, p. 187-188. (Translated and condensed from *Mesures & Controle Industriel,* v. 16, Mar. 1951, p. 97-98.)

The necessity for accurately measuring the temperature of a moving wire arises in the continuous heat treatment of steel wire and strip of diameter or thickness ranging from ½ to several millimeters. The arrangement uses the principle of temperature variation of the magnetic permeability of ferrous metals, is simple and convenient, and makes possible remote recording. (S16, ST)

304-S. New Temperature-Gradient Box Checks Furnace Characteristics. M. Bozsin. *Finish,* v. 8, July 1951, p. 30-31.

Special insulated box travels through continuous or box-type enameling furnaces. By means of a 6-point recorder, it checks temperature gradients for each of six locations, giving a complete chart record. In a test run with a furnace setting of 1560° F. and 17 min. furnace travel, a maximum temperature of 86° F. was reached inside the recording instrument. (S16)

305-S. Melting Brass and Bronze. James G. Dick. *Foundry,* v. 79, July 1951, p. 88-89, 153-154, 156, 158.

Previously abstracted from *Canadian Metals.* See item 325-S, 1950. (S22, E general, Cu)

306-S. Statistical Quality Control. H. H. Johnson. *Foundry,* v. 79, July 1951, p. 92-97, 189-191.

Application in the foundry. (S12, E general)

307-S. The *Iron Age* Chart of Comparable Tool Steel Brands. *Iron Age,* v. 167, June 28, 1951, insert between p. 70 and 71.

Third edition of chart shows equivalent brands manufactured by dif-

ferent U. S. companies for each of the ASM classes and subclasses. (S22, TS)

308-S. Analyzing Stabilized Stainless Now Takes Less Time. J. F. Young. *Iron Age,* v. 168, July 12, 1951, p. 91-92.

Chemical-spectrographic analysis of Ta-Cb line-intensity ratio and weight ratio is at least as accurate as any other routine method. Also, it is said to be faster than point-to-plane technique, and does not require use of stainless-steel standards. (S11, SS)

309-S. Magnetic Particle Inspection of Welded Pipe and Tubing. J. E. Clarke, R. A. Peterson, and T. J. Dunsheath. *Nondestructive Testing,* v. 9, Spring 1951, p. 7-13.

The process and its application. (S13, ST)

310-S. Radiography With Cobalt 60. Adair Morrison. *Non-Destructive Testing,* v. 9, Spring 1951, p. 14-22, 29.

Shows that Co^{60} can readily be substituted for Ra in industrial radiography. Advantages; data for steel are charted. 10 ref. (S13, ST)

311-S. Extruded and Drawn Steel Cartridge Cases Advance Toward Standardization. W. F. Stevenson. *Steel,* v. 129, July 9, 1951, p. 72-76, 98, 101-102, 105.

Development of joint Army-Navy procedures for mass-producing artillery components from low- and medium-carbon steel. Sizes range from 20 to 155 mm. (S22, T2, G4, CN)

312-S. Segregates in Steel Analyzed Spectrographically. *Steel,* v. 129, July 9, 1951, p. 78-80. (Based on paper by J. Convey.)

Special spectrographic techniques devloped for studying metal structures of many alloys, particularly the more complex types, and for making a continuous analysis of variation across a segregate. (S11, ST)

313-S. Production Problems. V. Steel Blanks for Brake Assemblies. *Iron and Steel,* v. 24, June 1951, p. 198.

Metallurgical investigation of above pieces which had been found to be unsatisfactory because of deviation from specified composition and also presence of decarburization. Deviation in composition was found to be relatively unimportant; decarburization was found to be caused by the fact that a rimming rather than a fully killed steel was used. (S21, CN)

314-S. The Control of Electric Element Furnaces to Fine Limits at High Temperatures for Research Purposes. T. W. Lomas, M. D. Jepson, and J. R. Rait. *Journal of the Iron and Steel Institute,* v. 168, June 1951, p. 126-134.

A problem in the measurement of corrosion, tensile properties, creep, rupture, fatigue, etc. Various types of controller. A commercial resistance thermometer/thyratron instrument is shown to be the most suitable on the grounds of cost, availability, and performance. Various types and their useful ranges. (S16, Q general)

315-S. Calibration Furnaces for Total-Radiation Pyrometers. E. J. Burton and R. Mayorcas. *Journal of the Iron and Steel Institute,* v. 168, June 1951, p. 151-155.

An electrically heated graphite-tube furnace 36 in. long and 3 in. internal diam. emits radiation which is substantially that of a black body and provides a sufficiently large source (at least 3 in. diam.) for existing industrial pyrometers. Temperature of the furnace may be rapidly changed within the range of calibration. (S16)

316-S. Control and Instrumentation of an Experimental Furnace. (In French.) G. W. Stein-Callenfels and R. Mayorcas. *Chaleur & Industrie,* v. 32, Mar. 1951, p. 59-70.

Design and auxiliary equipment of a tunnel furnace 7.5 m. long, 2 m. wide, and 2 m. high, made of refractory bricks 22 cm. thick. Regulation and control equipment. Chart records. (S16, S18)

317-S. Some Causes of Error in the Ultrasonic Testing of Metal Pieces. (In French.) Paul Bastien. *Métaux: Corrosion—Industries,* v. 26, Mar. 1951, p. 135-141.

Errors are caused by anomalies of propagation. The problem is still in the experimental state from the industrial standpoint. (S13)

318-S. On the Technique of Gamma-Ray Control. (In French.) H. Gerbeaux and M. Evrard. *Métaux: Corrosion—Industries,* v. 26, Apr. 1951, p. 159-165.

Apparatus, protection of personnel, and practical applications. (S13)

319-S. Use of Radioactive Elements in the Study of Steel and Industrial Metallurgical Processes. Applications to the Study of Segregations. (In French.) A. Kohn. *Revue de Métallurgie,* v. 48, Mar. 1951, p. 219-235.

44 references. (S19)

320-S. Observations on Inspection by Means of Gamma Rays. (In French.) M. Gerbeaux and M. Evrard. *Soudure et Techniques connexes,* v. 5, Jan.-Feb. 1951, p. 31-37.

Use of gamma rays for inspection of welds. Experiments performed and apparatus. (S13)

321-S. The Qualitative Analysis of Alloy Steels. (In German.) Claus Beermann and Helmut Hartmann. *Archiv für das Eisenhüttenwesen,* v. 22, May-June 1951, p. 159.

Simple spot-test procedures for V, Mn, Cr, Mo, and W in steels. (S11, AY)

322-S. Blast Furnace Instrumentation. E. T. Mortson and S. T. Paisley. *Blast Furnace and Steel Plant,* v. 39, July 1951, p. 789-799.

Various types of instruments. (S16, S18, D1, Fe)

323-S. Northrop Checks All Castings by Fluoroscopy. Thomas E. Piper and Justin G. Schneeman. *Machinery* (American), v. 57, July 1951, p. 172-177.

Principles of above nondestructive method of inspecting vital Al and Mg castings and its application. (S13, Al, Mg)

324-S. (Book) **Engineering Metrology.** K. J. Hume. 293 pages. Macdonald & Co., Ltd., 43 Ludgate Hill, London E. C. 4, England. 18 s.

Basic principles of the subject, illustrated with descriptions of contemporary equipment and methods of application. Chapters deal with mathematics, mechanics, optics, and heat and temperature: precision measuring and equipment used; the various standards of measurement; the question of limits and fit; and operations employed in manufacturing gages. (S14)

325-S. (Book) **Symposium on the Role of Non-Destructive Testing in the Economics of Production.** 157 pages. 1951. American Society for Testing Materials, 1916 Race St., Philadelphia. (Special Technical Publication 112.)

Pertinent papers are abstracted separately. (S13)

326-S. Analysis of Aluminum and Aluminum Alloys Using Pin Samples. R. W. Callon and L. P. Charette. *Analytical Chemistry,* v. 23, July 1951, p. 960-966.

A direct-reading spectrochemical method using an ARL research model quantometer with high precision source for the quantitative analysis of Al alloys. Elements of the order of 10% or higher were determined satisfactorily. (S11, Al)

327-S. Radiograph Inspection Adds to Drag Bit Life. J. M. Williams. *Drilling,* v. 12, July 1951, p. 35-36.

Nondestructive inspection of tungsten carbide inserts in drill-bit blades with gamma rays. (S13)

328-S. A Thermocouple System for Molten-Metal Temperature Measurement. L. H. Veiock. *Instruments,* v. 24, July 1951, p. 769-770, 794.

Specifications, techniques, and construction of apparatus used in measuring the temperature of liquid steel in the open-hearth furnace. (S16, D2, ST)

329-S. Comparison of Methods for Measuring Temperature of Molten Metals. J. W. Percy. *Instruments,* v. 24, July 1951, p. 766-768.

A brief history of various methods. Two types of immersion thermocouples are compared, and so are two types of blow-tube pyrometers. Operation factors. (S16)

330-S. Plate Calibration by Step Filter & Its Use in the Estimation of Manganese, Silicon & Vanadium in High Speed Steels. B. N. Bhaduri. *Journal of Scientific and Industrial Research,* v. 10A, May 1951, p. 101-109.

A rapid plate calibration method based upon the relative intensities of manganese lines 2939 and 2933 and its application to quantitative analysis of high speed steels. The method is sufficiently reliable and the values obtained for alloying elements in steels agree with the values obtained by chemical analysis. (S11, TS, Mn, V, Si)

331-S. Radio-Autographic Determination of Lead in Stainless. L. R. Standifer and Mars G. Fontana. *Metal Progress, v.* 60, July 1951, p. 65-69.

A technique using radioactive tracers in determining the distribution of small amounts of lead in a cast stainless alloy. (S10, S19, Pb, SS)

332-S. Use of Statistical Methods for Comparison of Iron Ores. (In Italian.) Aurelio Palazzi and Roberto Sacedote. *Metallurgia Italiana,* v. 43, May 1951, p. 180-184.

Graphs and charts illustrate methods. (S12, Fe)

333-S. Method of Sampling Steel Shipments for Hardenability Testing. (In Italian.) Aurelio Palazzi. *Metallurgia Italiana,* v. 43, May 1951, p. 185-189.

Treats above mathematically. (S12, J26, ST)

334-S. Procedure Approval Tests. Samuel S. Katsef. *Industry & Welding,* v. 24, Aug. 1951, p. 25-26, 62-64.

Test specifications and inspection procedure used by the Navy for equipment fabricated by welding. "Flowsheet" outlines various phases of test. (S13, K9)

335-S. Weld Inspection in Britain. M. Falk. *Welding Engineer,* v. 36, Aug. 1951, p. 44.

Use of radioactive iridium isotope (tr-192) to inspect welds. (S13, K9)

336-S. The Soft X-Ray Spectroscopy of Solids. E. R. Piore, R. H. Kingston, E. M. Gyorgy, and G. G. Harvey.

Review of Scientific Instruments, v. 22, July 1951, p. 543.

Reviews work on spectroscopic studies in the region 50-500 Å. Recent development in which photographic recording system was replaced by a Be-Cu photomultiplier. Metals from K through Cu are being investigated by this method. (S11)

337-S. Ultrasonic Inspection Today. H. E. Van Valkenburg. *Tool Engineer*, v. 27, Aug. 1951, p. 36-38.

Present status. (S13)

338-S. Ultrasonic Inspection of Quarry Equipment. John C. Smack. *Pit and Quarry*, v. 44, Aug. 1951, p. 103-104.

Testing apparatus and the method of testing different metal components of crushers, drills, etc. for fatigue cracks. (S13, Q7)

339-S. Some Thermocouple Details for Temperature Measurement. Howard W. Cole, Jr., *Product Engineering*, v. 22, Aug. 1951, p. 166-167.

Diagrams, table, and textual explanation. (S16)

340-S. Report of Committee A-1 on Steel. N. L. Michel, chairman. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 81-96.

Previously abstracted from *American Society for Testing Materials*, Preprint 1, 1950. See item 272-S, 1950. (S22, Q general, ST)

341-S. Report of Committee A-9 on Ferro-Alloys. W. C. Bowden, Jr., chairman. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 120-125.

Previously abstracted from *American Society for Testing Materials*, Preprint 5, 1950. See item 273-S, 1950. (S22, Fe-n)

342-S. Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. G. H. Harnden, chairman. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 159-166.

Previously abstracted from *American Society for Testing Materials*, Preprint 11, 1950. See item 274-S, 1950. (S22, Cu)

343-S. Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought. I. V. Williams, chairman. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 173-180.

Previously abstracted from *American Society for Testing Materials*, Preprint 13, 1950. See item 275-S, 1950. (S22, Al, Mg)

344-S. Report of Committee E-3 on Chemical Analysis of Metals. D. R. Evans, chairman. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 433-439.

Previously abstracted from *American Society for Testing Materials*. Preprint 102, 1950. See item 276-S, 1950. (S11)

345-S. Chemical Spectroscopy. Wallace R. Brode. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 513-559.

24th Edgar Marburg Lecture presents comprehensive survey of fundamentals, apparatus, procedures, and applications of spectroscopy in chemical analysis. Treats emission, absorption, infrared, ultraviolet, and visible-region spectroscopy. Spectra of a wide variety of materials, including metals, are illustrated. 61 ref. (S11)

346-S. The Development of a Flaw Detector for Tubes. R. D. Kodis. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 1196-1206; disc., p. 1206.

The a.c. bridge method of magnetic flaw detection was evaluated by application to smooth-bore tubes. Practical difficulties with the method led to investigation of the induction method. By proper combination of detector-head design and a recorder capable of displaying three variables, cracks are shown in picture form for easy evaluation. Use of the induction method for inspecting gun tubes, and for production inspection. (S13, ST)

347-S. Solution Methods of Spectrographic Analysis. *Metallurgia*, v. 44, July 1951, p. 45-49.

Investigations carried out by a panel set up by the British Non-Ferrous Metals Research Assn., on the applicability of above methods. (S11)

348-S. Radioactive Elements in the Study of Steels and Industrial Processes. J. Kohn. *Metal Treatment and Drop Forging*, v. 18, June 1951, p. 239-245; July 1951, p. 289-296.

Reviews recent developments and some investigations recently made in France. Segregation in steel was studied by this method. 38 ref. (S19, ST)

349-S. Inspection of Drop Forgings From a Metallurgical Standpoint. R. J. Brown. *Metal Treatment and Drop Forging*, v. 18, July 1951, p. 312-315.

Various tests which should be made on drop forgings, including superficial examination, chemical tests, and mechanical tests. (S13, Q general, ST)

350-S. Precision Measurement of Rockwell Hardness Diamond Penetrators. F. R. Tolmon and Jill G. Wood. *Engineering*, v. 172, July 20, 1951, p. 89-90.

Measurement of the angle of the

conical diamond penetrator on an optically projected image by means of a shadow protractor was found unsatisfactory. A new technique was devised, using an interference microscope. Apparatus and results. (S14)

351-S. Evaluation of Soundness of Cast Iron. *Institute of British Foundrymen,* 1951, 22 pages.

Experimental evaluation of various methods. Includes results obtained by radiography, ultrasonic flaw detection, electrical and magnetic methods, density determination, pressure testing, and other methods. General conclusions and recommendations. (S13, CI)

352-S. Platinum-Platinum Rhodium Thermocouples and Their Industrial Applications. Marcel Chaussain. *Institute of British Foundrymen,* Paper 996, 1951, 17 pages.

Methods for testing wires for above couples, of determining contamination and aging of the wires, and of use for determining temperatures of steel baths. (S16)

353-S. System of Studying Casting Defects. G. W. Nicholls and D. T. Kershaw. *Institute of British Foundrymen,* Paper 1003, 1951, 16 pages.

Record-card and control-chart system. Effects of various factors. (S12, E general)

354-S. Review of Present-Day Steel Foundry Radiographic Practice. G. M. Nichie. *Institute of British Foundrymen,* Paper 1011, 1951, 11 pages.

Includes diagrams, graphs, and illustrations. (S13, E11, CI)

355-S. Suitability of Microradiographic Methods for Metallurgical Problems. (In French.) G. A. Homes and J. Gouzou. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 251-261; disc., p. 261.

Methods are surveyed, particularly the method of "transparence". Applicability to chemical analysis and to detection of various flaws in steel and other metals. (S13, ST)

356-S. Determination of Hydrogen in Liquid Steel by Extraction in a Vacuum at 600°. (In French.) J. Bleton, S. Mischonsniky, G. Coin, and P. Bastien. *Revue de Métallurgie,* v. 48, June 1951, p. 471-485.

Choice of method, liberation of H_2 at 600°, mode of procedure, and value of the method. 25 ref. (S11, ST)

357-S. Measuring High Temperatures. (In French.) Pierre Rodicq. *Fonderie,* v. 64, Apr. 1951, p. 2423-2438.

The Land immersion pyrometer for measuring temperature of fused metals. Compares it with the American Leeds and Northrup pyrometer. Structural details and operation. (S16)

358-S. Statement on the Magnetic Comparator. (In French.) M. Infroit. *Circulaire d'Informations Techniques,* v. 8, No. 3, 1951, p. 299-300.

An electronic device for nondestructive testing of materials. Methods of operation and application are indicated. (S13)

359-S. Effect of Presence of Tin in Lead, and Vice-Versa, on the Spectrochemical Analysis of the Zinc-Lead-Tin System of High Zinc Content. (In French.) Juan Manuel Lopez de Azcona and Luis Jimeno Martin. *Spectrochimica Acta,* v. 4, No. 5, 1951, p. 265-279.

Studied for HNO_3 solutions of Zn with $Pb(NO_3)_3$ and Sn $Cl_3 + 2H_2O$ additions, and for electrodes Zn, Pb, Sn. 26 ref. (S11, Zn)

360-S. Comparative Study of Various Excitation Factors in the Quantitative Spectrographic Analysis of Slags. (In French.) J. Gillis and J. Eeckhout. *Spectrochimica Acta,* v. 4, No. 4, 1951, p. 284-301.

Excitation by d.c. arc, Feussner spark-unit, and "multisource" arc and optimum conditions for use. Results of spectrographic methods are compared with those of chemical analysis. It was found that the Feussner unit gives best results. 11 ref. (S11)

361-S. Nondestructive Testing of Materials. (In French and German.) Hch. Zoller. *Pro-Metal,* June 1951, p. 839-844.

X-ray, radioactive, and ultrasonic analysis. (S13)

362-S. The Application of Radioactive Isotopes in Material Testing. (In German.) O. Vaupel and N. von Wetterneck. *Metall,* v. 5, July 1951, p. 293-294.

Shows that γ-rays emitted by synthetic Ir isotopes can be used for X-ray recordings. Experiments were made with different materials, different films, and different instruments. Results reveal that recordings ordinarily fail to show sufficient details, but methods of increasing contrast are discussed. (S19)

363-S. Application of Statistical Methods to Quality Control and Materials Development. (In German.) Ernst Rossow. *Stahl und Eisen,* v. 71, June 21, 1951, p. 649-664.

Principles of statistical methods and computation of operational characteristics (OC curves) for different test plans. Importance of selecting probability of error from technical rather than statistical considerations. Advantages and disadvantages of statistical methods. 47 ref. (S12)

364-S. Spectrographic Analysis of Pure Metals. (In Italian.) D. M. Smith. *Metallurgia Italiana,* v. 43, Mar.-Apr. 1951, p. 121-128.

Analysis of Al, Cu, Pb, Mg, Ag, Au, Pt, and Zn. (S11)

365-S. Methods of Measuring Surface Roughness in the Technology of Surface Finishing. (In Italian.) L. Locati and B. Bianchi. *Metallurgia Italiana,* v. 43, May 1951, p. 176-179.

(S15)

366-S. Some Experiences in Service (Power, Oil and Chemical Plants). John J. V. Rutherford. *American Society for Metals,* "High Temperature Properties of Metals," 1951, p. 133-170.

A wide variety of experiences with metals at elevated temperatures, in corrosive media, or both conditions combined. Micrographs and macrographs show service failures and examples of good and poor resistance to service conditions.

(S21, Q general, R general, SG-g, h)

367-S. Temperature Measurement and Control: Characteristics of Types for All Uses. J. L. Garrison. *Industrial Gas,* v. 30, Aug. 1951, p. 6-7, 25-28.

Various temperature measuring systems and equipment. Includes the automatic control system used to regulate temperatures of gas-burning equipment and how to select proper control system for a given gas heated process. (S16)

368-S. Radiation Pyrometers Control New High-Gradient Heating Process. H. W. Cox. *Instruments,* v. 24, Aug. 1951, p. 878-879.

Temperature-control system for the high-speed high-gradient line of 13 furnaces at the Gary plant at National Tube Co. The basic principles of high-gradient heating are outlined briefly. (S16)

369-S. Radioactive Isotopes in Metallurgy. *International Chemical Engineering & Process Industries,* v. 32, Aug. 1951, p. 381-382, 385.

Recent applications. (S19)

370-S. The Mechanism of Exchange Between Radioactive Ions in Solution and Metal Surfaces. M. T. Simnad and R. C. Ruder. *Journal of the Electrochemical Society,* v. 98, Aug. 1951, p. 301-306.

The mechanism of exchange between metals and ions in solution was studied with radioactive Co ions in solutions into which various metals with different surface treatments were immersed in the presence and absence of O_2. The metals were washed after various times of immersion in the solutions, their acquired radioactivities measured, and the distribution of radioactive Co on the surface shown by means of autoradiographs. (S19, P15)

371-S. The Shape of Reflected Interference Fringes From Interferometers Coated With Thin Metal Films. J. Holden. *Journal of the Optical Society of America,* v. 41, Aug. 1951, p. 504-510.

A type of optical observation for study of very thin metal films. Shape or intensity distribution of reflected interference fringes from an interferometer which involves the thin film as its front or incident surface was observed to undergo a cyclic change as the metal film increases in mass per unit area. The effect was studied throughout the visible spectrum for Ag, Au, Al, Cu, and Cr, evaporated to form films of gradually increasing mass per unit area up to an equivalent thickness of 400 A. Brief mention of practical applications to current investigations of mechanisms of slip and twinning in metal crystals.

(S15, Ag, Au, Al, Cu, Cr)

372-S. Specifications Relating to Aluminium and Magnesium. *Light Metals,* v. 14, Aug. 1951, p. 418-427.

A revised list of British specifications brought up to date (May 1, 1951.) (S22, Al)

373-S. From a Metallurgist's Notebook: Zip Fastener Wire. H. H. Symonds. *Metal Industry,* v. 79, Aug. 10, 1951, p. 110.

An examination into the possible causes of failure which occurred in small nickel-silver zipper elements. Tests were made on the seven samples submitted for hardness, grain size, wire size, and composition. Failure was found to be primarily due to excessive hardness of the wire from which the zipper was manufactured, contributory causes being undercutting of the elements during stamping, and excessive iron content in one of the samples.

(S21, Q29, Cu)

374-S. Beta-Ray Thickness Gages. W. A. Black. *Metal Progress,* v. 60, Aug. 1951, p. 130, 132, 134.

Previously abstracted from "Noncontacting Thickness Gages for Flat Rolled Steel Producers." *American Iron and Steel Institute,* Preprint, 1951. See item 252-S, 1951. (S14, ST)

375-S. Thickness Measurement. Maynard R. Euverard. *National Lithographer,* v. 58, Aug. 1951, p. 30-33, 82-83.

New developments in measuring coatings. Two new instruments used for wet and dry film thickness determinations. Applications in metal lithography are given. (S14, L26)

376-S. Radiochemical Determination of Chromium, Vanadium and Molybdenum by Means of Radioactive Sil-

ver. J. Govaerts and Carlos Barcia-Goyanes. *Nature,* v. 168, Aug. 4, 1951, p. 198-199.

Includes standard curves of activities of the precipitate vs. amount of metal used. (S11, Cr, V, Mo)

377-S. Experiences in the Application of Spectrographic Analysis in the Grey-Iron Foundry. E. J. Ronnie and M. M. Hallett. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A77-A83; disc., p. A83-A86.

Previously abstracted from *Institute of British Foundrymen* (Paper No. 965). See item 311-S, 1950. (S11, CI)

378-S. Statistical Quality Control of Metalworking Operations. Part I. Lester F. Spencer. *Steel Processing,* v. 37, July 1951, p. 336-339.

Reviews developments and methods. (To be continued.) (S12)

379-S. Inspection by Optical Projection Methods. Part I. E. C. Polidor. *Tool Engineer,* v. 27, Aug. 1951, p. 43-46.

(To be continued.) (S14)

380-S. Study of Surface of Casting. (In English.) Kazuo Katori. *Japan Science Review,* v. 1, Dec. 1950, p. 11-18.

Factors which influence the casting surface were investigated by measuring the roughness of the mold surface and casting surface. Materials were cast iron and "Lautal" (composition not given.) (S15, E25, CI)

381-S. A Non-Destructive Method of Identification by Mechanical Sounding of Materials and Their Assemblies. (In French.) P. Le Rolland and P. Sorin. *Métaux: Corrosion—Industries,* v. 26, May 1951, p. 198-204.

Treats theory of double-pendulum method mathematically and discusses identification of structures and materials. Applications to systematic study of laws of resistance of materials. (S10)

382-S. A Non-Destructive X-Ray Method for the Determination of the Thickness of Surface Layers. P. Gay and P. B. Hirsch. *British Journal of Applied Physics,* v. 2, Aug. 1951, p. 218-222.

Method which has been applied to examination of layers produced by abrasion of single crystals and of metallic films deposited on polycrystalline bases. (S14)

383-S. Crawler Detects Gun-Barrel Cracks. R. D. Kodis and R. Shaw. *Electronics,* v. 24, Sept. 1951, p. 92-95.

Schematic diagrams of circuit arrangements of apparatus. After the gun barrel or other ferromagnetic tube is circularly magnetized, inside surface is magnetically scanned by pickup coil that rotates around crawler. Phototube arrangement on crawler keeps recorder in step with pickup motor. (S13)

384-S. How to Obtain Accurate Carbon Analyses. Wilfred H. White. *Foundry,* v. 79, Sept. 1951, p. 107.

Several suggestions for simplifying the chemist's work and assuring greater accuracy in the analyses made. (S11, CI)

385-S. Platinum-Platinum/Rhodium Thermo-Couples and Their Industrial Applications. Marcel Chaussain. *Foundry Trade Journal,* v. 91, Aug. 9, 1951, p. 147-156; Aug. 16, 1951, p. 189-194; disc., p. 194-195.

Previously abstracted from *Institute of British Foundrymen,* Paper 996, 1951. See item 352-S, 1951. (S13, CI)

386-S. Naval Gearing: War Experience and Present Development. J. H. Joughin. *Journal of the American Society of Naval Engineers,* v. 63, Aug. 1951, p. 651-665. *Engineering,* v. 171, Jan. 5, 1951, p. 25-27; Jan. 12, 1951, p. 55-56.

Previously abstracted from original in *Engineering.* See item 66-S, 1951. (S21, Q9, CN)

387-S. X-Ray Inspection of Light Alloys. Justin G. Schneeman. *Light Metal Age,* v. 9, Aug. 1951, p. 11-14, 16.

A general view of the functions of X-ray inspection in the light-metal industry. Recognition of common defects in Al and Mg alloys. Theory, methods, and equipment for modern practice. (S13, Al, Mg)

388-S. Magnetic and Chemical Analyses of Ores and Mill Products Containing Magnetite and Ilmenite. Erkki Laurila, O. Jantti, and R. T. Hukki. *Mining Engineering,* v. 3, Sept. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 797-802.

A diamond-drill core analyzer for determination of magnetic susceptibility of drill cores containing magnetic minerals, a magnetite-ilmenite analyzer for pulverized products, and a potentiometric method of chemical analysis for the determination of Fe, V, and Ti. (S11, Fe, Ti)

389-S. Methods for Testing Thickness of Electrodeposits. III. Comparison of Methods for Acid Copper on Steel. Harold J. Read and F. Ross Lorem. *Plating,* v. 38, Sept. 1951, p. 945-952, 958.

Same instruments can be used as for thickness measurements of Ni on steel. The simpler magnetic system for Cu on steel (only the base metal magnetic) permits use of

two additional commercial gages: the General Electric thickness gage and the Lea Lectromag. (S14, Cu, ST)

390-S. Inspection by Optical Projection Methods. Part II. *Tool Engineer,* v. 27, Sept. 1951, p. 52-54.

Advantages and limitations of the above. A typical problem of gaging on a small part. (S14)

391-S. Analyzer Controls Gas Cleaning Equipment at Blast Furnaces. *Steel,* v. 129, Aug. 27, 1951, p. 90, 94, 96.

Recently developed assembly sounds an alarm when flue-dust concentration exceeds a predetermined limit or when power failure leads to ineffective operation of the cleaning station. (S18, D1)

392-S. Total Radiation Pyrometers. (In French.) E. J. Burton, R. Mayorcas, and W. H. Pritchard. *Chaleur & Industrie,* v. 32, Aug. 1951, p. 205-212.

Various types, including fixed-mirror and diaphragm types and their calibration. (S16)

393-S. Automatic Temperature Regulation. (In French.) J. Bernot and P. Lambert. *Journal du Four Electriques et des Industries Electrochimiques,* v. 60, Mar.-Apr. 1951, p. 48-50.

Reviews various types of equipment on the basis of the literature. (S16)

394-S. Decomposition and Separation of Copper-Tin Alloys in a Stream of Hydrogen Chloride. (In German.) Peter Trautzl and W. D. Treadwell. *Zeitschrift für Naturforschung,* v. 6b, July-Aug. 1951, p. 229-232.

Equilibria of the reactions $2Cu + 2HCl$ and $Sn + 2HCl$, using the flow and circulation methods, were determined on high-Sn bronze; maximum reaction rates in the composition range from Cu_6Sn_5 to Cu_3Sn are explained by an assumed increase in diffusion rates of Sn atoms. Results are of interest in analysis of bronzes and also for complete separation of the components in scrap processing. (S10, S11, A8, Cu, Sn)

395-S. Quantitative Spectrographic Analysis of High-Purity Aluminum. (In Italian.) T. Nuciari. *Alluminio,* v. 20, July 1951, p. 227-230.

A preliminary discussion of experiments made to determine, by spectrographic analysis, the Fe-Si-Cu impurities in high-purity Al. Results obtained with "top" electrodes and condensed-spark excitation. (S11, Al)

396-S. Radiographic Investigation of Welds; An Attempt at Quantitative Evaluation of Defects. (In Italian.) Oscar Masi. *Metallurgia Italiana,* v. 43, July 1951, p. 261-269.

The method, including photomicrographs and charts. Experiments were performed with steel bars. (S13, ST)

397-S. (Book) **Instrumental Methods of Analysis.** Ed. 2. Hobart H. Willard, Lynne L. Merritt, Jr., and John A. Dean. 344 pages. 1951. D. Van Nostrand Co., 250 Fourth Ave., New York 3, N. Y.

A revision of the 1948 edition. Primarily an introduction to the use of various instruments and methods in analytical chemistry. Not intended to be comprehensive or a reference work. Principal additions are chapters on polarimetry, miscellaneous methods, and chromatography. Chapters on radioactivity, X-ray methods, and polarography were completely rewritten. (S11)

398-S. (Book) **Radioisotopes; Industrial Applications.** G. H. Guest. 185 pages. 1951. Pitman Publishing Corp., 2 W. 45th St., New York City. $4.50.

Basic ideas involved in the use of isotopes, indicating typical examples of their application in industry. Use of tracers in metallurgical, glass and ceramic, petroleum, rubber, friction, and lubrication research. (S19)

399-S. The High-Purity Revolution in Analytical Chemistry. Sydney Abbey. *Canadian Mining and Metallurgical Bulletin,* v. 44, Sept. 1951, p. 576-579; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 354-357.

The growing interest in high-purity metals involves as much application of optics, electricity, and others branches of physics as it does of analytical chemistry. 29 ref. (S11)

400-S. Evaluation of Soundness in Cast Iron; Report and Recommendations of Sub-Comimttee T. S. 20 of the I. B. F. Technical Council. A. Tipper, chairman. *Foundry Trade Journal,* v. 91, Aug. 23, 1951, p. 211-219. Aug. 30, 1951, p. 253-260; Sept. 6, 1951, p. 283-289; disc., p. 289-291.

Limitations of radiographic and ultrasonic methods of revealing unsoundness when applied to cast iron are investigated. Results obtained by both destructive and nondestructive testing methods are compared. Other possible means of detecting unsoundness in cast iron. Results of tests and factors influencing the quantitative estimation of unsoundness in cast iron. (S13, CI)

401-S. Cold Metal and Basic Foundry Practice. III. *Industrial Heating*, v. 18, Sept. 1951, p. 1604, 1606, 1608, 1610, 1680.

Discusses the control of liquid steel temperatures in hearth and ladle presented by F. A. Von Gruenigen and W. D. Lawther at the 33rd National Open Hearth Conference of AIME. See item 73-S, 1951. (S16, D2, D9, ST)

402-S. Thermometry. M. F. Behar. "The Handbook of Measurement and Control," *Instruments Publishing Co.*, (Pittsburgh) 1951, p. 82-97.

Consists of five parts covering foundations of temperature measurement, mercury in glass thermometers, solid expansion thermometers, pressure-spring or filled-system thermometers, and resistance thermometers. Diagrams. (S16)

403-S. Pyrometry. M. F. Behar. "The Handbook of Measurement and Control", *Instruments Publishing Co.*, (Pittsburgh), 1951, p. 107-120.

Includes thermo-electric pyrometry, total-radiation pyrometry, visual optical pyrometry and autometric pyrometry. Charts and diagrams. (S16)

404-S. Automatic Control of Temperature. P. R. Ewald. "The Handbook of Measurement and Control," *Instruments Publishing Co.* (Pittsburgh), 1951, p. 123-126.

Examples of processes with various characteristics. (S16)

405-S. Dimensional Gaging and Inspection. Roger L. Geer. "The Handbook of Measurement and Control," *Instruments Publishing Co.* (Pittsburgh), 1951, p. 234-240.

Methods, techniques and apparatus. (S14)

406-S. Electric Resistance Thermometers. R. H. Warring. *Machinery Lloyd* (Overseas Ed.), v. 23, Sept. 1, 1951, p. 81, 83-84.

A survey. Diagrams of a typical potentiometer circuit are given. (S16)

407-S. New Developments in Xeroradiography. Robert C. McMaster. *Non-Destructive Testing*, v. 10, Summer 1951, p. 8-25.

Xeroradiography is a further development in the field of xerography, a dry photographic process invented by Chester F. Carlson and developed at Battelle Memorial Institute. Basic steps in the xeroradiographic process and fundamental principles. Results of practical tests. The technique is useful for examination of internal structure of a wide variety of metallic and nonmetallic materials and assemblies. (S13)

408-S. Iridium 192 for Gamma Ray Radiography. Adair Morrison. *Non-Destructive Testing*, v. 10, Summer 1951, p. 26-28.

Results of experiments are charted and discussed. (S13)

409-S. Intensification of Underexposed Industrial Radiographs. G. M. Corney and H. R. Splettstosser. *Non-Destructive Testing*, v. 10, Summer 1951, p. 29-32.

In many cases, underexposed industrial radiographs can be salvaged by treatment with Kodak Intensifier In-6. Intensification, which follows normal processing, may be carried on in full room light, and, if done immediately after fixation, adds less than half an hour to normal processing time. Typical results are tabulated, charted, and illustrated. (S13)

410-S. Some Aspects of Cobalt Radiography. D. T. O'Connor and J. J. Hirschfield. *Non-Destructive Testing*, v. 10 Summer 1951, p. 33-39.

Problem of scattered radiation in gamma radiography. Elements controlling definition and sensitivity. A simple technique has been developed which permits minimum focal film distance for optimum sensitivity to be predetermined. A combined sensitivity-technique chart is recommended which makes possible selection of a technique to produce the desired result with respect to exposure-time range of absorber thickness and plate sensitivity. 13 ref. (S13)

411-S. Rupture by Bending of Certain Shafts and Axles. (In French). Jean Peltier. *Métallurgie et la Construction Mécanique*, v. 83, Aug. 1951, p. 591-593.

Short theoretical study, aiming to explain the rupture of pieces with an insufficient safety margin. (S21, Q26)

412-S. Recent Progress in Flash Radiography. J. C. Clark. *American Society for Testing Materials*, "Papers on Radiography," 1949, p. 3-9.

The use of the Westinghouse Micronex X-ray equipment for research problems involving material motions for 2500 to 25,000 ft. per sec. is illustrated by selected flash radiographs. A circuit is described which, when used with a Micronex X-ray tube, will produce single X-ray pulses lasting no longer than 1/10 microsecond. (S13)

413-S. 10-Mev. X-Ray Technique. D. T. O'Connor, E. L. Criscuolo, and A. L. Pace. *American Society for Testing Materials*, "Papers on Radiography," 1949, p. 10-19; disc., p. 19.

Data on beam intensity distribution, lead screen efficiency, absorption of radiation by steel plate, and penetrameter sensitivity. Ionization shield thickness data is given as a check on the validity of the radiographic results. (S13, ST)

414-S. Radiography and Autoradiography by Photoelectrons. D. T. O'Connor and W. R. Maddy. *American Society for Testing Materials,* "Papers on Radiography," 1949, p. 20-33.

Two separate techniques for the examination of microstructures. The first deals with the absorption of photo-electrons generated from Pb sheet by X-rays in thin slices or films of material. The second technique depends on the difference in the efficiency of photo-electron production by materials of different atomic number. Graphs and photoelectron radiographs. 11 ref. (S13, M23)

415-S. Mobilizing the Van De Graaf Generator for Precision Radiography. E. Alfred Burrill. *American Society for Testing Materials,* "Papers on Radiography," 1949, p. 34-39; disc., p. 39-40.

The Van de Graaf 2-million-volt generator has been developed for nondestructive testing of bulky, immovable objects. New techniques in high-voltage X-ray tube construction, improvements in electrical designs, simplified controls, and auxiliary equipment have all contributed to the ultimate compactness of this type of X-ray source. (S13)

416-S. A Universal Exposure Calculator for Radium Radiography and Its Application to Current Radiographic Films and Techniques. Noah A. Kahn, Emil A. Imbembo and Jay Bland. *American Society for Testing Materials,* "Papers on Radiography," 1949, p. 41-59.

Standardized exposure calculator is used in connection with steel and other materials and with all types of industrial radiographic film, or with radiographic techniques which aim at image density levels higher or lower than the normal net density of 1.00. Method of determining the film speed rating factors and data on the speed rating factors of a number of commercial types of radiographic film. 12 ref. (S13, ST)

417-S. A Discussion on Radiographic Sensitivity. Carlton H. Hastings. *American Society for Testing Materials,* "Papers on Radiography," 1949, p. 60-68; disc., p. 68-69.

Radiographic sensitivity, radiographic definition, and radiographic contrast are defined and discussed. (S13)

418-S. A Revised Procedure for Establishing Radiographic Standards. Leslie W. Ball. *American Society for Testing Materials,* "Papers on Radiography," 1949, p. 70-74; disc., p. 74.

Recommendations and discussion. (S13)

419-S. An Investigation of Radiography in the Range From 0.5 to 2.5 Million Volts. W. W. Buechner, R. J. Van de Graaff, H. Feshbach, E. A. Burrill, A. Sperduto, and L. R. McIntosh. *American Society for Testing Materials,* "Papers on Radiography," 1949, p. 75-95.

Production, absorption, and scattering of high-voltage X-rays, application of high-voltage X-rays to radiography, and technique of high-voltage radiography. (S13, ST)

420-S. How to Choose Equipment for Nondestructive Testing. Carlton H. Hastings. *Canadian Metals,* v. 14, Sept. 1951, p. 20-24. 26-27.

Previously abstracted from *American Foundrymen's Society.* Preprint 51-15, Apr. 1951. See item 206-S, 1951. (S13)

421-S. New Testing Methods. *Canadian Metals,* v. 14, Sept. 1951, p. 46.

Methods such as optical projection, supersonics, failure forecasting, gaging devices, and mechanical "brains" in the metal industry. (S13, S14)

422-S. Atomic By-Products for the Foundry. Thomas A. Dickinson. *Foundry,* v. 79, Oct. 1951, p. 188, 191-192, 194.

Use of radioisotopes in the development of new casting alloys, to prepare and to maintain the quality of existing casting alloys to facilitate the cleaning and inspection of castings, and to lead to development of new and useful cast alloy products. Other applications. 16 ref. (S19, E general)

423-S. Another Inspection Method for Quality Control. *Industry & Welding,* v. 24, Oct. 1951, p. 43-44, 47.

A portable magnetic inspection unit for detecting cracks and fractures in ferrous metal parts. Applications. (S13, Fe)

424-S. Nonferrous Alloy Specifications. Norman E. Woldman. *Iron Age,* v. 168, Oct. 4, 1951, p. 240-244, 249-255. (Condensed from the 1949-1950 Supplement of the ASTM).

Detailed tables of all specifications for nonferrous structural metals, their common uses and their equivalents in other specifications. (S22, EG-a)

425-S. Determination of Hydrogen in Liquid Steel. R. M. Cook and J. D. Hobson. *Journal of the Iron and Steel Institute,* v. 169, Sept. 1951, p. 24-25.

A comparison between two methods is given as a result of collaborative work between two laboratories. The methods employ a sealed mold and a quenched notched pencil. Results are given for 15 casts made by acid and basic openhearth, and basic electric-arc processes. Satisfactory agreement is shown for comparative results obtained by two methods. (S11, ST)

426-S. Rapid Analysis Methods in Steelmaking. L. H. Arner and H. H. Johnson. *Journal of Metals,* v. 3, Oct. 1951, p. 858-859.

Methods for the determination of C S and P. (S11, ST)

427-S. Bearing Down on Quality. A. V. Toth. *Magazine of Tooling and Production,* v. 17, Oct. 1951, p. 60-61, 194, 196, 198, 206-207.

Cleveland Graphite Bronze Co. reports its effective use of statistical quality control methods, and its products. (S12)

428-S. Ford Indicates the Way to Quality. Roscoe M. Smith. *Magazine of Tooling and Production,* v. 17, Oct. 1951, p. 62-63, 96, 108, 209.

Indicating-type gages used by the Ford Motor Co. to inspect the parts for quality conformance. (S13)

429-S. Profitable Experiences in Quality Control. Leo Harrington. *Magazine of Tooling and Production,* v. 17, Oct. 1951, p. 64-65, 200, 204, 212, 216.

The use of quality control resulted in better and more uniform products at less cost at the King-Seeley Corp., Ann Arbor, Mich. (S12)

430-S. Gears of Exceptional Quality. H. S. Gist. *Magazine of Tooling and Production,* v. 17, Oct. 1951, p. 66-67, 74, 78.

Recent developments at the Nash-Kelvinator Corp. made possible by its quality control programs. The quality control methods, coupled with new cutting tools, have made it possible to produce transmissions of exceptional quality. (S12)

431-S. High Speed Photography Applied to Production Quality. J. H. Waddell. *Magazine of Tooling and Production,* v. 17, Oct. 1951, p. 76, 80, 84, 202, 210, 214.

Use by some industries in quality control. (S13, S12)

432-S. Air Force Quality Control Requirements. O. C. Griffith, Jr. *Magazine of Tooling and Production,* v. 17, Oct. 1951, p. 82, 86, 184-190.

Progressive approach of the Air Force toward government inspection and quality control. Air Force contractors are required to conduct sufficient inspection at all stages, from material receipt and to packaging of the end item, to assure that all contractual requirements are complied with. (S12, S general)

433-S. Chemical Spot Tests for Nickel and Molybdenum. Elmer H. Snyder and Arthur H. Klein. *Metal Progress,* v. 60, Sept. 1951, p. 78-79.

Experiences in identification of carbon and low-alloy steels containing small amounts of Ni and Mo. It was found that scaled and shot-blasted surfaces may give erroneously high indications because of diffusion. Spot-test solutions and procedures. (S10, CN, AY)

434-S. Short-Range Radiography for Weld Inspection. Ernest H. S. van Someren. *Welder,* v. 20, Jan.-June, 1951, p. 10-11.

Tests were carried out on the effect of working distance between X-ray tube and film. (S13)

435-S. Arc Spectra Between Aluminum Electrodes in Air and in Hydrogen. (In French.) Raymond Ricard and Alexis Dufour. *Comtes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, July 30, 1951, p. 370-372.

Shows that this method of testing for impurities in commercial Al gives better results than the ordinary methods employed. (S13, Al)

436-S. Application of 1, 10-Phenanthroline to the Spectrophotometric Determination of Copper in Ores. J. P. Mehlig and P. M. Gruzensky. *Chemist Analyst,* v. 40, Sept. 1951, p. 52-56.

(S11, Cu)

437-S. Winding Ropes—Safety and Control. A. E. McClelland. *Colliery Guardian* (Overseas Supplement), Summer 1951, p. 21-27.

Various types of deterioration and possible failure of wire rope, including those caused by corrosion, fatigue, wear, and their combinations. (S21, Q7, Q9, R general, ST)

438-S. Direct Reading Spectroscopy Speeds Aluminum Production. J. R. Churchill.. *Iron Age,* v. 168, Oct. 11, 1951, p. 97-100.

High-speed analysis of Al alloys on direct-reading quantometers has cut waiting time of Alcoa's holding hearths to a minimum. Of 7 million determinations made each year, 60% are already being made by this method. A complete report may be obtained in 4 min. or less. (S11, Al)

439-S. How to Interpret Radiographs of Pipe-Line Welding Defects. A. G. Barkow. *Oil and Gas Journal,* v. 50, Oct. 4, 1951, p. 177-180, 183, 186, 268-269, 271.

The more common defects both as found by radiographic inspection

and actual examination of a cross-section of the specimen. (S13)

440-S. New Methods for Non-Destructive Inspection. Thomas A. Dickinson. *Welding Engineer,* v. 36, Oct. 1951, p. 56-58.

Old and new test methods, such as radioactive isotopes, painting the flaws, and xerographic radiography. (S13)

441-S. Nondestructive Materials Testing. (In French and German.) Hch. Zoller. *Pro-Metdl,* v. 4, Aug. 1951, p. 871-877.

Use of γ-rays and ultrasonics in materials testing. The two most widely used methods of generating ultrasonics, also the ray-penetration process, the Echolot testing method, and the sono-optical process. (S13)

442-S. Magnetic-Particle Testing. (In Swedish.) Paul Bjornson, Klas Erik Johansson, and Per Stake. *Jernkontorets Annaler,* v. 135, no. 4, 1951, p. 129-168.

Magnetic particle method of detecting cracks, inclusions and other defects in ferromagnetic materials such as malleable and cast iron, and steel. Principles, equipment, and applications of the method. 50 ref. (S13, CI, ST)

443-S. Apparatus for Determining Hydrogen in Steel. (In Swedish.) Kurt Amberg and Stig Kämpinge. *Jernkontorets Annaler,* v. 135, no. 5, 1951, p. 177-185.

Apparatus which utilizes hot extraction at 700° C. The accuracy of the determination is sufficient from a practical point of view. The largest errors are due to losses of H_2 before the analysis is made. These errors may be reduced by means of rapid cooling of the test piece and storing the sample at a low temperature. (S11, ST)

444-S. (Pamphlet) **Report on Standard Samples for Spectrochemical Analysis.** C. H. Corliss, chairman. 31 pages, 1950. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. (Technical Publication 58B.) $1.25.

The report is divided into sections representing related groups of materials for which extensive applications of spectrographic analysis were made. Status of standards in each group of materials. Those available, forms of the samples, the intended uses, and typical compositions. Included are: Fe and steel, Al and its alloys, Mg and its alloys, Zn, Pb, and Sn alloys, and Cu alloys; as well as a miscellaneous group of samples. (S11)

445-S. (Book) **The Handbook of Measurement and Control.** M. F. Behar, editor. 291 pages. 1951. Instruments Publishing Co., Inc., 921 Ridge Ave., Pittsburgh 12, Pa. Free to new subscribers to *Instruments* ($4.00 per year).

Designed to bring classifications, operating factors, and typical applications of instruments to users, manufacturers, and students. Includes all indicating, recording, integrating, controlling, and computing devices used in measurement, inspection, testing and control applications. Laboratory, scientific, engineering and industrial instruments are included. All basic methods and mechanisms are covered, including pneumatic, hydraulic, electric, and electronic instruments. The emphasis is on practical factors. Terminology is considered carefully. (S general)

446-S. (Book) **Papers on Radiography.** 95 pages, 1949. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. (Special Technical Publication 96.) $1.75.

Development and progress in radiographic techniques and apparatus. Applications. Each paper is abstracted separately. (S13, ST)

447-S. How to Inspect Screwthread Elements. William M. Stocker, Jr. *American Machinist,* v. 95, Oct. 15, 1951, p. 137-152.

Practical inspection methods; alternate measurement methods; how to save inspection time; common inspection errors; production planning; and salvage procedure. (S14, S13, T7)

448-S. Quality Control Charts Boost Forge-Shop Performance. R. D. Long. *American Machinist,* v. 95, Oct. 15, 1951, p. 154-155.

Longer die life, lower forging cost, and higher quality resulted from use of quality-control charts at International Harvester Co. (S12, F22)

449-S. Stainless-Steel Specifications. *American Machinist,* v. 95, Oct. 15, 1951, p. 163, 165, 167.

A tabular compilation of composition limits specified by various U. S. government agencies. (S22, SS)

450-S. Spectrochemical Analysis of Palladium and Platinum Sponge. J. E. Hawley, W. J. Wark, C. L. Lewis, and W. L. Ott. *Canadian Mining and Metallurgical Bulletin,* v. 44, Oct. 1951, p. 669-677; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 425-433.

Reduction of platinum-group metals to the black form from either or both acid and alkaline media by means of aluminum has been shown to afford a convenient and accurate method of preparing both spectro-

graphic standards and refinery sponge metals for spectrographic analysis. 16 ref. (S11, Pt, Pd)

451-S. Ordnance Using X-Rays to Inspect Complex Assemblies. George Elwers. *Iron Age,* v. 168, Oct. 25, 1951, p. 95-99.

Complex assemblies are inspected without disassembly by means of 22,000,000-volt X-rays, saving much time and labor. (S13)

452-S. A Note on a Simple Technique for Obtaining Absorption Coefficients of Metals and Alloys for Complex Radioactive Spectra. Frank E. Jaumot, Jr., and Foster C. Nix. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1294.

Technique involves dissolution in a solution of polyvinyl alcohol. Application to diffusion of Co in Co-Al alloys. (S19)

453-S. The Spectrochemical Determination of Zinc, Lead, and Iron in Copper and Copper Alloys. Frederick V. Schatz. *Journal of the Institute of Metals,* v. 80, Oct. 1951, p. 77-84.

Method suitable for routine plant-control determination of Zn, Pb, and Fe in brasses and leaded brasses. Factors important to accuracy of the analysis. (S11, Cu)

454-S. Variance Analysis Reduces Manufacturing Costs. John Pugsley. *Steel,* v. 129, Oct. 29, 1951, p. 78, 80, 82, 84-85.

A planned, intensive effort of the operating and accounting departments to reduce cost through elimination of unfavorable variances from standard resulting from operating performance. Application to blooming-mill supplies and yields, to coil breaks in electrolytic cleaning, and to flying-shear delays, at Tennessee Coal, Iron, and R. R. Co., Birmingham. (S12)

455-S. Spectrophotometric Analysis of Baths for Electrodeposition of Chromium. (In French.) Jean. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 16-18.

Reviews the method on the basis of existing information. Theoretical basis and practical applications. (S11, L17, Cr)

456-S. Experiments with Ultrasonics for Testing Sheet Metals, Castings, and Ceramics. (In German.) A. Dietzel. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.,* v. 28, June 1951, p. 299-302.

Equipment used to detect internal defects. (S13)

457-S. Industrial Metal Detector Design. Curtiss R. Schafer. *Electronics,* v. 24, Nov. 1951, p. 86-91.

How to design a metal detector for a specific application. Fundamental principles, basic equations and major design factors. A typical commercial industrial detector. 19 ref. (S10)

458-S. System of Studying Casting Defects. G. W. Nicholls and D. T. Kershaw. *Foundry Trade Journal,* v. 91, Oct. 4, 1951, p. 383-390; Oct. 11, 1951, p. 423-430; disc., Oct. 25, 1951, p. 473-478.

Previously abstracted from *Institute of British Foundrymen,* Paper 1003, 1951. See item 353-S, 1951. (S12, E general)

459-S. Cybernetics, a Super Science. George W. Slomin. *Iron Age,* v. 168, Nov. 1, 1951, p. 124-126.

The future trend in guiding research and development in the production of servo-mechanisms that can perform simple routine decisions. (S18)

460-S. Surface Finish Measurement; Comparison of Stylus and Optical Interference Methods. C. Timms and C. A. Scoles. *Metal Treatment and Drop Forging,* v. 18, Oct. 1951, p. 450-454.

By modifying a standard stylus instrument, surface-finish measurements by mechanical means are shown to compare favorably with those made with an interference microscope. (S15)

461-S. Liberal Use of Gage Blocks Pays Dividends. H. J. Chamberland. *Modern Machine Shop,* v. 24, Nov. 1951, p. 182, 184, 186, 188, 190, 192, 194, 196, 198, 200.

Several practical methods of obtaining maximum use of gage blocks. (S14)

462-S. X-Ray Spectroscopy of the Solid State. L. G. Parratt and E. L. Jossem. *Physical Review,* ser. 2, v. 84, Oct. 15, 1951, p. 362.

Fundamental mechanisms, with observations on KCl. This case is not unusual and many observations in X-ray spectroscopy of solids (both emission and absorption) may be similarly interpreted in terms of discrete atomic levels with consequent improvement in fit with expected energy position and line width, and with better understanding of forces in the solid state. (S11)

463-S. A Photographic Pyrometer. Donald W. Male. *Review of Scientific Instruments,* v. 22, Oct. 1951, p. 769-772.

Instrument indicates apparent surface temperatures by photographing hot surfaces and correlating the variable density of the photographic negative with the apparent surface temperature. The need for critically controlled photographic and development technique is eliminated by

incorporating into every photograph the images of standard targets whose apparent surface temperatures are independently determined with an optical pyrometer. (S16)

464-S. Ford Hot Lab Tests Steel Production Applications of Atomic Energy. *Steel Equipment & Maintenance News,* v. 4, Oct. 1951, p. 14-15.

How radioactive isotopes produced from the uranium chain-reacting pile of the U. S. Atomic Energy Commission, Oak Ridge, Tenn., are being used in industrial research by Ford Motor Co. Specifically they are being applied to steelmaking, cupola practice, welding, and thickness control. (S19, ST)

465-S. Summary of the Research Work of the Trace Elements Section, Geochemistry and Petrology Branch, for the Period April 1, 1948-December 31, 1950. John C. Rabbitt. U. S. Atomic Energy Commission, TEI-148-A, June 1951, 96 pages.

Mineralogic and petrographic investigations of radioactive rocks, minerals, and ores; investigations of chemical methods of analysis for U, Th, and other elements and compounds in radioactive materials, and related chemical problems; investigations of spectrographic methods of analysis for a wide variety of elements in radioactive materials; and investigations of radiometric methods of analysis. (S11, EG-h)

466-S. Apparatus for Analyzing Gases Liberated During Attack on Metallurgical Products. (In French.) P. Vignial. *Bulletin de la Société Chimique de France,* July-Aug. 1951, p. 587.

Apparatus is used especially for determination of the percentages of metal and of alkaline carbides or alkaline-earth metals present in metallurgical products. (S11)

467-S. Determination of Magnesium in Cast Irons. (In French). **I. Spectographic Method.** Remi Paton. **II. Chemical Method.** Jacqueline Fuchs. *Fonderie,* Aug.-Sept. 1951, p. 2605-2612.

Principles and methods used for both types of analysis. Results and data. 15 ref. (S11, CI, Mg)

468-S. Continuous Control of Thickness of Sheet Material During Rolling. (In French.) A. Th. Wuppermann. *Métaux: Corrosion—Industries,* v. 26, July-Aug. 1951, p. 306-309.

A simple X-ray instrument developed by the Laboratory of Prof. Dr. Berthold. (S14, F23)

469-S. A Method for Determination of Hydrogen in Steels. (In French.) F. Meunier and A. Demarez. *Revue de Métallurgie,* v. 48, Aug. 1951, p. 598-608.

Method applicable to solid and liquid steels. Details of experiments and theoretical evaluation. The method gives results of high fidelity, particularly if the mean of two separate tests is taken. 45 ref. (S11, ST)

470-S. A Semicro Gas Analyzer. (In French.) L. Moreau and Ph. Albert. *Revue de Métallurgie,* v. 48, Sept. 1951, p. 684-686.

Apparatus for determination of gases in metals. The arrangement avoids exposing the operator to mercury vapor. (S11)

471-S. Determination of Oxygen in Steels by the Gotta Method. (In French.) J. Massinon, N. Stoll, and M. Urbain. *Revue Universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 94, Sept. 1951, p. 265-281.

Extensive study of the Gotta and other methods based on vacuum fusion. Results show satisfactory agreement. (S11, ST)

472-S. Plant Experience in the Nondestructive Testing of Metals. (In German.) Heinz Mayer. *Metall,* v. 5, Aug. 1951, p. 331-334.

Use of different magneto-inductive testing instruments for sorting and for detecting defects. (S10, S13)

473-S. Nondestructive Testing of Tungsten and Molybdenum Wire With the Aid of the Wire-Crack "Kawimeter". (In German.) E. Gromaodka. *Metall,* v. 5, Aug. 1951, p. 335-336.

An exceedingly sensitive instrument for detecting cracks and defects in wire too fine to be revealed by other methods. Typical cracks are illustrated by micrographs. Principle of operation of the "Kawimeter" is not indicated. (S13, W, Mo)

474-S. Desulfurization of Nickel. (In German.) O. Werner. *Metall,* v. 5, Aug. 1951, p. 323-328; Sept. 1951, p. 381-384.

Effect of sulfur and oxygen on the high-temperature ductility of Ni. Methods of determining S and Mg in Ni. 20 ref. (S11, Q23, Ni)

475-S. Rapid Analysis of Aluminum Alloys. (In German.) J. Eisen. *Metall,* v. 5, Oct. 1951, p. 436-441.

Procedures and laboratory layout for routine analysis of Al alloys for Cu, Mn, Mg, Fe, Si, Pb, and Zn. 14 ref. (S11, Al)

476-S. New Test Paper for Testing Porosity and Identifying Metals. (In German.) Artur Kutzelnigg. *Metalloberfläche,* sec. B, v. 3, Aug. 1951, p. B113-B115.

Importance of test papers is that the metals and metal coatings can be rapidly tested even by unskilled personnel. Photographs show appearance of test panels. (S10, S13)

477-S. Analytical Control of Potassium Cyanide Electroplating Baths. (In German.) W. Savelsberg. *Metalloberfläche,* sec. B, v. 3, Aug. 1951, p. B116-B117.

Determination of silver and carbonate content of the baths. (S11, L17)

478-S. Application of Nondestructive Testing Methods in the Rolling Mill. (In German.) Werner Jellinghaus and Hermann Moller. *Stahl und Eisen,* v. 71, Sept. 13, 1951, p. 995-1002.

Use of X-rays, ultrasonic frequencies, and magnetic fields for testing metals for defects, grain size, thickness, hardness, etc. (S13, S14, F23, ST)

479-S. Structure Rating Charts for Steel and Cast Iron. (In German.) Hans-Joachim Wiester and Gottfried Finke. *Stahl und Eisen,* v. 71, Sept. 13, 1951, p. 1002-1011.

Survey of literature includes standards for grain size, nonmetallic inclusions, heat treating, carbide segregation, graphite inclusions and formations, and pearlite content. 39 ref. (S22, M27, ST, CI)

480-S. Separating Mixtures of Aluminum-Alloy Chips by Sieving, Preceded, if Necessary, by Grinding. (In German.) August Buckeley. *Zeitschrift für Erzbergbau und Metallhuttenwesen,* v. 4, Sept. 1951, p. 329-334.

Proposed method of separating chips of different metals, alloys, etc., is based on the fact that the different metals and alloys differ in grain size and brittleness. Tables and graphs show that this simple method gives satisfactory results. (S10, A8, A1)

481-S. Platinum Rhodium Thermocouples and Their Industrial Applications. *Foundry Trade Journal,* v. 91, Oct. 25, 1951, p. 487-488.

Additional comments by R. C. Jewell and E. G. Knowles on above paper by Marcel Chaussain. See item 352-S, 1951. (S16)

482-S. Inspection of Investment Castings Utilizes X-Ray Equipment to Check Soundness. *Precision Metal Molding,* v. 9, Nov. 1951, p. 45-46. (S13)

SECTION T

APPLICATIONS of METALS in EQUIPMENT and INDUSTRY

1-T. The Development of a Hollow Blade for Exhaust Gas Turbines. H. Kohlmann. *National Advisory Committee for Aeronautics.* Technical Memorandum 1289, Dec. 1950, 51 pages. Translated from *Zentrale für wissenschaftliches Berichtswesen der Luftfahrtforschung des Generalluftzeugmeisters* (Berlin-Adlershof, Germany), Untersuchungen und Mitteilungen No. 788, Dec. 1943.

Development of blade profiles, calculation of temperature distribution and stresses in the blade shank, development of manufacturing methods, attachment of blades in the rotor, forms of blades with box root, and their mounting in the rotor. (T25, Q25)

2-T. Increasing Drop Forging Die Life. Part I. John Mueller. *Steel Processing,* v. 36, Dec. 1950, p. 616-618.

Recommendations for design, heat treatment, stress relief and selection of die material. (T5, F22, J general, TS)

3-T. Stainless Steel Research Leads Way to Larger TV Screen. *Steel Processing,* v. 36, Dec. 1950, p. 621, 645.

Development of 17% Cr steel having a coefficient of expansion parallel to that of glass, for use in TV tubes. (T1, P11, SS)

4-T. Multiply Spring Life Without Changing Design. Clyde W. Oicles and Fred K. Landecker. *Iron Age,* v. 166, Dec. 21, 1950, p. 80-82.

How 11 times more fatigue resistance was imparted to the springs in the Web Wilson oil well drill-pipe tongs. To do it, a change from SAE 1095 to SAE 6150 steel, a change in heat treating methods, and adoption of stress peening was required. (T7, J general, G23, AY)

5-T. Construction Materials in the Paper Industry. Part III. Acid Pulping. *Chemical Engineering,* v. 57, Dec. 1950, p. 223-224, 226, 228, 230, 232, 234, 236.

Consists of the following brief articles: "Worthite", by W. E. Pratt; "Lead", by Kempton H. Roll; "Cements", by Raymond B. Seymour; "Rubber", by James P. McNamee; "Iron and Steel"', by Albert W. Spitz and Arthur E. May; "High-Silicon Irons", by Walter A. Luce; "Nickel, Nickel Alloys", by H. O. Teeple; "Chlorimets", by Walter A. Luce; "Stoneware", by M. J. Winson; and "Durimet 20", by Walter A. Luce. (T29, R5)

6-T. Wraps Taken Off Low-Power Nuclear Reactors. *Steel,* v. 127, Dec. 25, 1950, p. 57-60.

Uranium-graphite, uranium-heavy water, and homogeneous types of energy piles. Large quantities of aluminum, cadmium, lead, graphite, and concrete are required. (T5, T29, Al, Cd, Pb, C)

7-T. How Copper-Base Casting Alloys Are Used in Electrical Industry. R. A. Colton. *Materials & Methods,* v. 32 Dec. 1950, p. 57-61.

Manufacturing cost of electrical equipment can be frequently cut by proper selection of materials, based on conductivity, strength, corrosion resistance, machinability, and castability. Physical (electrical conductivity) and mechanical properties are tabulated and charted. (T1, P15, Q general, Cu)

8-T. Welding Electrodes and Rods for Ferrous and Nonferrous Metals. H. R. Clauser. *Materials & Methods,* v. 32. Dec. 1950, p. 67-82.

Manual is intended as a guide for those faced with the problem of filler-metal selection. It covers the standard type electrodes and welding rods for joining all the common ferrous and nonferrous metals and alloys, including irons and steels, Cu-base alloys, Al, Mg, Ni alloys, Zn, and Pb. (T5, K1, K2)

9-T. Recommended Carbide Grades for Various Applications. *Materials & Methods,* v. 32, Dec. 1950, p. 85.

Table correlates manufacturers' recommendations for applications of nine trade-named products. (T6, C-n)

10-T. Metal Grit for Sand-Blasting; Advantages of Si:Mn Steel Over Quartz. *Chemical Age,* v. 63, Dec. 2, 1950, p. 777. (T5, L10, AY)

11-T. Gresford Cages—Progress Report. *Light Metals,* Nov.-Dec. 1950, p. 522-523.

Condition of all-aluminum mine-shaft cages after 12 mos. operation. Condition was satisfactory in all respects, including wear at points of friction, paint-film durability, and corrosion resistance. (T28, Al)

12-T. The London Motor Shows. *Light Metals,* Nov.-Dec. 1950, p. 524-529.

Light-metal applications in automobiles exhibited. (T21, Al)

13-T. Aluminium-Alloy Structures—An Assessment. C. Marsh. *Metals,* Nov.-Dec. 1950, p. 530-536.

Problems and some controversial aspects concerning present and future use of light alloys in structures. (T26, Al)

14-T. Light-Alloy Castings—A Record of Post-War Achievement. *Light Metals,* Nov.-Dec. 1950, p. 537-549.

A variety of castings for general engineering and aircraft use, made by a British firm. Materials are both Al and Mg alloys. (T24, Al, Mg)

15-T. Concerning Aluminum-Steel Trolley Wires for Street Cars and Trolley Buses. (In French.) Louis Albert. *Revue de l'Aluminium,* v. 27, Sept. 1950, p. 308-312.

Three years after installation on a trolley-bus line in the Paris suburbs, inspection of an Al-steel trolley wire showed promising results. After 400,000 bus passages, the very hard collecting shoes have caused an average wear of 0.01 in., so that the useful life of this type of contact wire should correspond to 2 million passages. Behavior of the wire was found quite satisfactory as regards corrosion, vibration, and resistance to short circuits. (T1, Q9, R3, Al)

16-T. Self-Supporting Roofs. (In French.) Maurice Victor. *Revue de l'Aluminium,* v. 27, Sept. 1950, p. 315-321.

Several examples of roofs made of light-alloy materials. Weight is only about 2 lb. per sq. ft. and, up to 600 ft. diameter, no central supports are necessary. (T26, Al)

17-T. Antenna Pole for Radio Communication. (In French.) *Revue de l'Aluminium,* v. 27, Sept. 1950, p. 324-327.

New type of pole. (T1, Al)

18-T. Small Handling Equipment. (In French.) Henri Hugonnet. *Revue de l'Aluminium,* v. 27, Sept. 1950, p. 331-335.

Miscellaneous wheelbarrows, trucks, ladders, etc., made of light alloy. Advantages. (T5, Al)

19-T. Results From a Redesigned Continuous Heating Furnace. (In German.) Erich Faber. *Stahl und Eisen,* v. 70, Nov. 23, 1950, p. 1111-1115; disc., p. 1115.

Factors to be considered in redesigning furnace so as to produce an optimum degree of efficiency. The principles discussed apply also to other types of heating or heat treating furnaces. (T5, J general)

20-T. Steels for Die Casting and Die Forging. (In Czech.) Rudolf Stefec. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 76-79.

Development of steels for use in die casting individual metals and alloys in Czechoslovakia and elsewhere is compared. Factors causing wear of dies. Need for development of new steels or alloys for more economical casting of brass and higher melting-point metals. Defects occurring during heat treatment and their causes. (T5, E13, F22, TS)

21-T. Stainless Resistor Gives High Starting Torque. *Iron Age,* v. 166, Dec. 28, 1950, p. 74.

Application of stainless steel in a.c. induction motors used in Le Tourneau earthmoving equipment. (T1, SS)

22-T. Aluminum Railroad Furniture: Functional, Lightweight, Attractive. *Modern Metals,* v. 6, Dec. 1950, p. 40-41. (T10, T23, Al)

23-T. Static Magnetic Memory for Low-Cost Computers. Marshall Kincaid, John M. Alden, and Robert B. Hanna. *Electronics,* v. 24, Jan. 1951, p. 108-111.

A magnetic material having a rectangular hysteresis loop provides information storage independent of mechanisms, variable data-handling rate up to 30,000 p.p.s., and pulse storage without power. The material was developed in Germany and is now produced by Allegheny Ludlum Steel Corp. under the name "Deltamax." How it is applied. (T8, P16, SG-n, p)

24-T. Extruded Aluminum Tubing Forms Sturdy Lightweight Scaffold-

ing. *Western Machinery and Steel World,* v. 41, Dec. 1950, p. 52-54.
(T26, Al)

25-T. Application of Alloy Steels to High Temperature Steam Turbine Service. W. L. Heishmann. *Blast Furnace and Steel Plant,* v. 38, Dec. 1950, p. 1447-1450, 1482-1483.

Influences of temperature, heat treatment, and composition. Advantages of vanadium. Effects on mechanical properties and microstructure. 15 ref.
(T25, Q general, AY, SG-h)

26-T. Modern Materials and Their Relation to Power-Generating Equipment. George N. Moffat. *Engineering Experiment Station News* (Ohio State University), v. 22, Dec. 1950, p. 29-30, 54.

Metallurgical and ceramic problems involved in design of power-generating equipment for operation at higher and higher pressures, speeds, and operating temperatures. (T25, SG-h)

27-T. Metal-Backed TV Picture Tubes. C. T. Waugh. *Tele-Vision Engineering,* v. 1, Dec. 1950, p. 12-14.

Mechanism of operation of metallized and nonmetallized tubes. Advantages of the former, which is produced by vapor deposition of Al on a plastic film which is first applied to the original phosphor coating. (T1, L25, Al)

28-T. Review of the Month: The Use of Lead in the Plating Room. *Plating,* v. 38, Jan. 1951, p. 39, 57.

Corrosion resistance; formability; and applications.
(T5, R5, L17, Pb)

29-T. Steel Plates; Modern Metallurgical Trends in Production. W. Barr. *Iron and Steel,* Nov. 28, 1950, p. 421-422.

Metallurgical problems in connection with production of ship plates and boiler plates. Brittle fracture of ship plate; variations in composition of large boiler plate; steels for pressure vessels.
(T22, T26, Q23, CN)

30-T. Electrical Transmission Lines Protected by Aluminum Conduits. (In French.) Maurice Victor. *Revue de l'Aluminium,* v. 27, Oct. 1950, p. 363-367.

Use in the Rogerstone plant of Northern Aluminium Co. in Great Britain. Advantages over steel conduit. (T1, Al)

31-T. Ventilation and Air-Conditioning Ducts for Synthetic-Fiber Plants. (In French.) J. Borel. *Revue de l'Aluminium,* v. 27, Oct. 1950, p. 370-371.

Describes and illustrates use of pure Al or Al alloys. Advantages with respect to resistance to corrosive external atmospheres likely to be encountered, and also with respect to light weight. (T27, Al)

32-T. New French Liner: "Liberté et Kairouan." (In French.) Pierre Vidal. *Revue de l'Aluminium,* v. 27, Oct. 1950, p. 374-376.

Emphasis on uses of Al alloys. (T22, Al)

33-T. Metallic Hatch Covers of the Light Alloy A-G5 for Rapid Handling. (In French.) *Revue de l'Aluminium,* v. 27, Oct. 1950, p. 377-378.

Hatch covers installed on the new French liner "Liberté et Kairouan." (T22, Al)

34-T. Greenhouses in Light Alloys. (In French.) Andre Chevrier. *Revue de l'Aluminium,* v. 27, Oct. 1950, p. 379-381.

Greenhouse with an Al alloy framework, also a cowbarn with a sheet Al roof. (T26, Al)

35-T. Concerning the Research of A. A. Baikov on the Metallurgy of Materials Used in the Transportation Field. (In Russian.) N. P. Shchapov. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Oct. 1950, p. 1513-1521.

Reviews important contributions of Baikov to heavy industry in the U.S.S.R. through his research in the metallurgy of materials used in transportation, particularly railroads. (T23)

36-T. Roofing Tile Made of Steel Powder Cement. (In English.) Minoru Hamada. *Japan Science Review,* ser. 1, v. 1, Mar. 1949, p. 210-212.

Steel-powder cement is a new cement suitable for making roofing tiles and for wall plaster, etc. Reason for hardening, effect of method of manufacture on properties of the cement, properties of the mortar, method of making steel-cement tiles and their properties. (T26, ST)

37-T. Investigation of Coal-Pick Steel From the Metallurgical Point of View. (In Japanese.) Tetsutaro Mitsuhashi, Yutaka Imai, and Shin Yokoi. *Journal of Mechanical Laboratory,* v. 4, July 1950, p. 143-146.

Several carbon steels made by different Japanese firms were investigated. Recommendations for composition and heat treatment. Alloy steels are recommended for stock more than 25 mm. in diam.
(T28, CN)

38-T. Patton Tanks Roll From Detroit Arsenal. Charles H. Wick. *Machinery* (American), v. 57, Jan. 1951, p. 136-145.

How 47-ton Patton tanks are being produced from lighter and slower Pershing tanks; and how M-24 tanks are being overhauled at Detroit Arsenal. Operations include machining, flame cutting, hard surfacing, and welding.
(T2, G17, G22, K general, L24, ST)

39-T. Two New Gear Materials. *Machinery* (American), v. 57, Jan. 1951, p. 181-188. Condensed from paper by C. M. Schwitter.

Second of two articles. The mechanical properties of ductile iron, and how this material can be used in manufacturing of heavy-duty gears. (T7, Q general, CI)

40-T. Two New Gear Materials. C. M. Schwitter. *Automotive Industries*, v. 104, Jan. 1, 1951, p. 42-45, 82, 84, 86, 88.

See abstracts of condensed version from *Machinery* (American), items 528-T, 1950, and 39-T, 1951.
(T7, Q general, AY, CI)

41-T. Aluminum Exterior Facing for Lightweight Fire-Rated Wall Construction. O. M. Mader. *Corrosion* (News Section), v. 7, Jan. 1951, p. 1.

Illustrates 2 buildings on which the above was used. (T26, Al)

42-T. Two Steels Make Our Plastic Molds. R. W. Brown. *American Machinist*, v. 95, Jan. 8, 1951, p. 112-113.

Tests at Westinghouse which cut mold-steel types to two for all requirements. Molds are improved, heat treating problems simplified, and cost reduced. For machined cavities, SAE 3335 plus 0.25% Mo is used. For hubbed cavities, a nominal composition of 0.07% max. C, 0.20-0.40% Mn, 0.40-0.60% Mo, and 4.5-5.0% Cr was selected. Work-hardening characteristics are charted. (T5, Q AY, TS)

43-T. Packaging Notebook. VIII. Returnable Metal Drums. R. W. Lahey. *Chemical Engineering*, v. 58, Jan. 1951, p. 210, 212-214.

Materials of construction, design, and fabrication procedures. Al, stainless steel, Ni, and Mg are sometimes used, as well as carbon steel. (T5, G general, CN, SS, Al, Ni, Mg)

44-T. New Defense Roles for Special Steels. *Steel Horizons*, v. 13, Winter 1950-51, p. 3-5, 26.

An illustrated survey. (T2, AY)

45-T. Hollywood Has a Stainless Heart. *Steel Horizons*, v. 13, Winter 1950-51, p. 6-7.

Varied uses of stainless steel in the motion-picture industry.
(T9, SS)

46-T. Stainless Steel in the Orange Juice Bonanza. *Steel Horizons*, v. 13, Winter 1950-51, p. 16-18.

Uses of stainless steel in orange-juice plants. (T29, SS)

47-T. Steel Hands for Shaping Tough Plastics. *Steel Horizons*, v. 13, Winter 1950-51, p. 20-21.

Use of die steels in molding of plastics. (T5, TS)

48-T. Reducing the Cost of Permanent Tooling. Frank Charity. *Modern Machine Shop*, v. 23, Jan. 1951, p. 202-204, 206, 208, 210, 212, 214, 216, 218.

Techniques for obtaining permanent production molds and dies at costs which are comparable to those of temporary tooling. The method consists, briefly, of producing a metallic cavity or shell on a low-melt thermoplastic pattern and separating the shell from its pattern so that the metallic impression can be reinforced for production usage.
(T5, G16)

49-T. Die Cast Brass for Simpler Tooling. *Die Castings*, v. 9, Jan. 1951, p. 21, 54.

Use for heavy-duty electric motor brush holders. (T1, Cu)

50-T. Holes and Bosses Reduce Assembly Time. *Die Castings*, v. 9, Jan. 1951, p. 22-23, 58-61.

Use of Zn-alloy die castings in time-and-date stamping mechanisms.
(T8, Zn)

51-T. Die Cast Mountings Protect Delicate Shipments. *Die Castings*, v. 9, Jan. 1951, p. 24-26.

Mountings made by Lord Mfg. Co., Erie, Pa., involve a permanent bond of natural or synthetic rubber to die-cast Al-alloy members.
(T5, Al)

52-T. Gas Burner Caps. D. D. Burnside. *Die Castings*, v. 9, Jan. 1951, p. 28-30, 36.

Die-cast Al burner caps for domestic gas ranges. Advantages.
(T10, Al)

53-T. A Review of Some Military Uses for Die Castings. *Die Castings*, v. 9, Jan. 1951, p. 32-34.

Covers Zn, Al, and Mg.
(T2, Mg, Al, Zn)

54-T. Pipe Conveyor Wins Battle Against Abrasion. *Heating, Piping & Air Conditioning*, v. 23, Jan. 1951, p. 123.

Standard pipe and fittings wore out rapidly when subjected to action of sand, silica, and other glass-furnace charges at high velocities. Adoption of Ni-Cr white iron gave excellent results. (T27, CI)

55-T. Modern Metallurgical Trends in the Production of Steel Plates. W. Barr. *British Steelmaker*, v. 16, Dec. 1950, p. 636-642.

Previously abstracted from *Iron*

and Steel. See item 29-T, 1951. (T22, T26, Q23, CN)

56-T. The O.P.E.C. Home. In French.) Maurice Victor and Jean Blanchot. *Revue de l'Aluminium,* v. 27, Nov. 1950, p. 405-413.

French prefabricated house utilizing a maximum amount of Al alloys both inside and outside. (T26, Al)

57-T. Submarine Transmission of Three-Phase Current. The Third Conductor. (In French.) *Revue de l'Aluminium,* v. 27, Nov. 1950, p. 414-415.

Canadian system by which electric power is sent across a 3-mile channel as 12,000-volt, 3-phase current through two single-phase cables. Cable armor is Al wire, which serves as the third conductor. (T1, Al)

58-T. The Banana Box—A Folding Container for Transportation of Bananas. (In French.) *Revue de l'Aluminium,* v. 27, Nov. 1950, p. 425.

Large Al-alloy box with capacity of 134.2 cu. ft. (T29, Al)

59-T. New Self-Lubricating Materials for Machine Construction. (In German.) H. Winkelmann. *Metall,* v. 4, Dec. 1950, p. 504-505.

Production and characteristics of a sintered bearing metal (Devametall) whose excellent self-lubricating properties are based on the fact that its metallic ingredients and a large percentage of colloidal graphite were mixed by diffusion. Composition of Devametall is not given. (T7, SG-c)

60-T. Characteristics Indices for the Adherence of Pasty Masses to Solids. (In German.) Hans Bahlsen. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Dec. 11, 1950, p. 989-993.

Primary object of the study was to find suitable solid vs. pasty mass (foods) combinations in which adhesiveness is eliminated or at least reduced to a minimum in order to reduce the tendency of foods to stick to materials of construction of food-processing machinery. Properties that cause adhesiveness and methods for measuring these properties were investigated. Results are compared with practical experience. 10 ref. (T29)

61-T. Contact Materials in Telegraph Apparatus. E. B. Gebert and T. F. Cofer. *Western Union Technical Review,* v. 5, Jan. 1951, p. 32-40.

Requirements, properties of the various types, design, and applicabilities. (T1, SG-r)

62-T. Aluminum-Clad Iron for Electron Tubes. W. Espe and E. B. Steinberg. *Tele-Tech,* v. 10, Feb. 1951, p. 28-30, 72.

Claims that "P-2 Iron," a European development, can be used in vacuum-tube manufacture as a substitute for Ni. Details of fabrication procedures, properties, and applications. (T1, L22, Fe, Al)

63-T. Precision Steel Tubes; Some Industrial Applications of Small-Diameter Bores. *Iron and Steel,* v. 23, Dec. 1950, p. 501-503.

Miscellaneous applications. Selection of alloys for different uses. Use of nonferrous alloys in certain types of tubing. (T7)

64-T. Anodes. (Concluded.) (In German.) Edmund R. Thews. *Metalloberfläche,* sec. B, v. 2, Oct. 1950, p. 152-155; Dec. 1950, p. 187-188.

Oct. issue: Zn and Cd anodes, their uses, and harmful impurities in the respective anode metals. Dec. issue: Sn and Pb anodes. (T5, L17, Zn, Cd, Sn, Pb)

65-T. Outlook for Aluminum in the Automobile Industry. Clay P. Bedford. *Modern Metals,* v. 6, Jan. 1951, p. 22-25.

Present and potential usage without consideration of impact of the war emergency. (T21, Al)

66-T. Aluminum Castings Improve Design of Vaneaxial Fans. F. L. Church. *Modern Metals,* v. 6, Jan. 1951, p. 28-30. (T10, Al)

67-T. Magnetic Separator Housed in Aluminum. *Modern Metals,* v. 6, Jan. 1951, p. 32.

Principal advantage is the nonmagnetic character of Al. Separators are used in various chemical industries to remove tramp metal. (T29, Al)

68-T. Modern Aluminum Wall Plates Feature Alumilite Finishes. *Modern Metals,* v. 6, Jan. 1951, p. 34. (T26, Al)

69-T. Roll-Up Aluminum Doors Easy to Operate; Save Space. *Modern Metals,* v. 6, Jan. 1951, p. 36.

Doors used to cover up sink and range when not in use, in modern kitchenettes. (T26, Al)

70-T. Telescopic Gangway for English Port Has Light, Rugged Aluminum Frame. *Modern Metals,* v. 6, Jan. 1951, p. 38-39. (T26, Al)

71-T. Magnesium Dockboard Employs Extruded, Cast, and Wrought Parts. Gene Beaudet. *Iron Age,* v. 167, Feb. 1, 1951, p. 107-109.

Just as strong but ¼ as heavy as steel plates, Mg dockboard is finding wide application. Each unit is individually designed. Some carry

30,000-lb. axle loads, but typical designs carry around 1000 lb. (T26, Mg)

72-T. Power Losses in Transmission Line Hardware. E. H. Sparling. *Hydro Research News,* v. 2, July-Sept. 1950, p. 12-15.

Results of laboratory studies, which demonstrate benefits of nonmagnetic hardware. Compares power losses with steel or malleable iron clamps vs. Al alloy clamps. Temperature-rise and mechanical-strength data. Includes economic analysis. (T1, P15, Al)

73-T. Hunt Cites Increased Defense Use of Aluminum Following Korea Outbreak. Roy A. Hunt. *Metals,* v. 21, Jan. 1951, p. 9, 12.

"Outstanding progress" during year in development of new Al and Mg products for aircraft wings. (T24, Al)

74-T. Ocean Going Cargo—Packed in Aluminum. Hugh G. Jarman. *Canadian Metals,* v. 14, Jan. 1951, p. 38-39.

Use of large Al boxes for handling and shipment of miscellaneous cargo. Advantages are 1000-lb. weight reduction as compared with similar steel containers, corrosion resistance, and security against pilferage. (T10, Al)

75-T. Communications Metallurgy. Earle E. Schumacher. *Journal of the Institute of Metals,* v. 78, Sept. 1950, p. 1-23.

Function of the metallurgical department in a communications system. The need for metallurgical research and development, the origin of metals problems, requirements imposed on metal components, and integration of metallurgical developments into an operating communications system. Illustrative examples demonstrate the complementary roles of engineering and research in correlating properties of metals with their structure, and structure with fabrication method. (T1)

76-T. Aluminium Conductors: Weight-Saving; Terminals and Methods of Attachment; Cable-Asseembly Tests. W. W. Schumacher. *Aircraft Production,* v. 13, Jan. 1951, p. 21-26.

Comparative data are tabulated and charted. Equipment and terminals are diagrammed and illustrated. (T1, Al)

77-T. Stainless Steel Trains for New York Subways. *Engineer,* v. 190, Dec. 29, 1950, p. 651. (T23, SS)

78-T. New Seating for the Orchestra —Royal Albert Hall. *Light Metals,* v. 14, Jan. 1951, p. 4-6.

Magnesium alloy chairs and their assembly. (T10, Mg)

79-T. Ships' Lifeboats. *Light Metals,* v. 14, Jan. 1951, p. 32-35.

Use of Al in 24-ft. lifeboats. (T22, Al)

80-T. "Holospar" Construction System. *Light Metals,* v. 14, Jan. 1951, p. 44-45.

System of tubular framing and interlocking panels, utilizing the principles of triangulation in bracing joints and a modified form of "stressed skin" effect in panelling, used for panel trucks. (T26, Al)

81-T. Aluminium Composites in Architecture. (Concluded.) Joseph B. Singer. *Light Metals,* v. 14, Jan. 1951, p. 52-56.

The nature and uses of light metal integrally associated with nonmetallic materials in building construction. (T26, Al)

82-T. Wrapping Process for Production of High-Pressure Reactors for Chemical Synthesis. (In German.) Julius Schierenbeck. *Brennstoff-Chemie,* v. 31, Dec. 20, 1950, p. 375-381.

A central cylinder is wrapped with successive layers of grooved and interlocking steel ribbon, the ribbon being electrically heated as it is wrapped, but cooled to room temperature after application. Reactors produced by this method were found to be much stronger than one-piece chambers. (T29, G general)

83-T. Nickel Alloys in Glass and Pottery Production. *Ceramics,* v. 2, Jan. 1951, p. 606-609.

Surveys applications. (T29, Ni)

84-T. Ordnance Holds Key to Vast Iron Powder Growth. Bill Packard. *Iron Age,* v. 167, Feb. 15, 1951, p. 109-110.

Domestic iron-powder capacity will have to be expanded many times its present size if the Ordnance Corps adopts iron-powder rotating bands for shells. A long development program is believed nearing the decision stage now. (T2, H general, Fe)

85-T. Telephone Type Relays; Arc Suppression and Contacts. V. E. James. *Product Engineering,* v. 22, Feb. 1951, p. 136-140.

Electrical characteristics, ratings, and applications of contacts made of different materials and alloys. Protective enclosures for telephone-type relays. (T1, P15, SG-r)

86-T. Production of Earth-Moving Equipment. Rolt Hammond. *Welding & Metal Fabrication,* v. 19, Jan. 1951, p. 11-18.

Forming and welding equipment and procedures used by a British firm. (T4, G general, K general, CN)

87-T. Minor Uses of the Light Metals. I. Titanium in Alloys. *Light Met-*

als, v. 14, Jan. 1951, p. 46-49.
First article of series on details of some minor applications of Ti, Al, Mg, and Be (T general, Ti)

88-T. (Book) **Materials of Construction.** John H. Bateman. 568 pages. 1950. Pitman Publishing Corp., 2 W. 45th St., New York 19, N. Y.
An engineering text supplying a background of knowledge of the raw materials, properties, and production. Covers mineral aggregates, cementing materials, concrete, structural clay products, building stone, lumber, iron, steel, aluminum, and magnesium. Includes extensive chapter bibliographies.
(T26, Al, Fe, Mg, ST)

89-T. (Pamphlet) **Fifth Annual Report, July 1, 1949 to June 30, 1950.** *Motor Industry Research Assn.* (Brentford, England), Oct. 1950, 53 pages.
Includes reports of current work on leaded fuels, fatigue strength of crankshafts, fuel sprays and lubricating oils for internal-combustion engines, copper-lead bearings, mechanical properties of parts, weathering of body finishes, deep-drawing of sheet metals, and metal finishing. (T21)

90-T. (Book) **Aluminum in Road Transport.** 80 pages. 1950. Northern Aluminium Co., Ltd., Banbury, England.
See Proceedings published by Aluminium Development Association, item 531-T, 1950. (T21, Al)

91-T. Simple Fittings Can Be Die Cast for Special Restaurant Equipment. *Die Castings,* v. 9, Feb. 1951, p. 19, 58.
Typical examples of Zn die castings made for automatic devices for storing and dispensing dishes in restaurants and other eating places. (T10, Zn)

92-T. Husky But Not Hefty. *Die Castings,* v. 9, Feb. 1951, p. 25-26.
Use of Al die castings in chain hoists. (T7, Al)

93-T. Low Investment Costs—High Quality Products. *Die Castings,* v. 9, Feb. 1951, p. 27-28.
Al and Zn die castings are used to produce two household items: an unusual ash tray and a garment hook of novel design. (T10, Al, Zn)

94-T. Bearing Properties of Zinc for Quiet Window Operation. Allen C. Boucher. *Die Castings,* v. 9, Feb. 1951, p. 30-31, 56.
Miscellaneous examples of die-cast Zn building hardware. (T6, Zn)

95-T. Because of High Humidity Aluminum is Preferred in These Die Castings For Use With Textile Machines. *Die Castings,* v. 9, Feb. 1951, p. 32-34, 57-58.
(T29, Al)

96-T. Calcium in Batteries Proves Superior to Antimony Alloy. *Chemical and Engineering News,* v. 29, Feb. 19, 1951, p. 665-666.
New long-life storage battery in which 0.5% Ca replaces 12% Sb. Other present and potential uses of this plentiful material. (T1, Ca)

97-T. New Technique for Obtaining Heat-Transfer Parameters of the Wall and Combustion Gas in a Rocket Motor. M. E. Ellion. *Transactions of the American Society of Mechanical Engineers,* v. 73, Feb. 1951, p. 109-114.
Test method for obtaining gas sidewall temperatures in a rocket motor in order to evaluate suitability of various alloys for rocket-motor construction. Eight alloys were studied by use of a thick-walled water-cooled nozzle into which cylindrical specimens could be inserted. A modification of this technique is suggested for measuring combustion-gas film coefficient in rocket motors. The alloys were Armco iron; SAE 1010; Types 347, 446, and 310 stainless; 61S-T Al, Type "A" Ni; Inconel X; and Cu. Oxidation characteristics were observed.
(T25, R2, CN, SS, Al, Ni, Cu, SG-h)

98-T. Metals for High-Pressure Hydrogenation Plants. G. A. Nelson. *Transactions of the American Society of Mechanical Engineers,* v. 73, Feb. 1951, p. 205-211; disc., p. 211-213.
Results of tests and data from operating plants, from which it is possible to establish practical operating limits for carbon and alloy steels for all degrees of severity of service. Additional corrosive effects by S, N_2, and CO.
(T29, R9, SG-h, CN, AY)

99-T. A Simple Means of Measuring Large Magnetic Fields. G. K. T. Conn and B. Donovan. *Journal of Scientific Instruments,* v. 28, Jan. 1951, p. 7-9.
Measurement of electrical resistance of Bi should be convenient for the above. Early use of the Bi spiral has not been continued since the resistance is erratic and unreliable. By using very thin fibers of Bi drawn down in soda glass, these difficulties are avoided and rapid, reliable, and reproducible measurements may be made. Such specimens, however, show marked anisotropy, so that resistance depends on orientation with respect to the field. By etching the glass away and winding a close coil, crystalline or-

der is drastically reduced. 16 ref. (T8, P16, P15, Bi)

100-T. A Review of the History, Theory and Uses of Metal-Foil Insulation. H. Manley. *Sheet Metal Industries,* v. 28, Feb. 1951, p. 161-166.

Concerned largely with Al foil, although a Pb-Sn-coated steel made by American Flange Co. is also mentioned. 14 ref. (T27, Al, CN)

101-T. Ausco's Diversified Production Facilities. Joseph Geschelin. *Automotive Industries,* v. 104, Mar. 1, 1951, p. 38-39, 55.

Facilities of Auto Specialties Manufacturing Co., Hartford, Mich., for manufacture of crankshafts, etc., for tractors and automobiles. Includes press work, impact testing of crank shafts, foundry practice, and heat treatment. (T21, AY)

102-T. Hotchkiss Announces All Light-Alloy Car. W. F. Bradley. *Automotive Industries,* v. 104, Mar. 1, 1951, p. 41, 65.

New French five-passenger, four-door sedan having a weight of 2376 lb., a wheel base of 98 in., a front-seat width of 59 in., and a rear seat width of 56 in. (T21, Al)

103-T. In Electronics Emphasis is on Magnesium for Weight Saving. *Magazine of Magnesium,* Feb. 1951, p. 2-5.

Miscellaneous applications. (T1, Mg)

104-T. Magnesium: Metal of Tomorrow? *Bookbinding and Book Production,* v. 53, Feb. 1951, p. 38-40.

Advantages of Mg for printing-plate production. (T9, Mg)

105-T. Metal Panels Rapidly Covered 41-Story Frame of Building With Stainless Skin. *Engineering News-Record,* v. 146, Feb. 22, 1951, p. 40-41.

Two applications of light-gage steel helped speed erection of a 41-story office building in Pittsburgh. In one case, stainless steel was formed into story-high exterior-wall panels. In second, low-carbon steel was shaped into bay-length floor decking. (T26, CN, SS)

106-T. Prefab Stainless Steel Swimming Pool Assembled at Site. *Progressive Architecture,* v. 32, Feb. 1951, p. 96.

(T26, SS)

107-T. Ductile Iron Replaces Steel in Shafting. *Steel Equipment & Maintenance News,* v. 4, Feb. 1951, p. 12.

34 generator shafts over 7 ft. in length were recently produced by Cooper-Bessemer Corp. in ductile cast iron. These shafts replaced a forged steel shaft of somewhat different design. (T25, CI)

108-T. Cylinder Heads for Sleeve-Valve Aero Engines. J. Hinde. *Metallurgia,* v. 43, Jan. 1951, p. 11-14.

Considerable changes have been necessary in design and construction of the cylinder heads. Some of the problems involved in the manufacture of a fabricated two-piece head. The heads consist of a Cu alloy containing 0.45-0.80% Cr, plated with Ni. To this base is brazed a fin pack of Cu. Details of plating solution and conditions and of cleaning and pretreatment. Plating is followed by a diffusion heat treatment and inspection. Finally, the base is brazed into a steel body. (T21, L17, J general, K8, Cu, Ni, ST)

109-T. Magnesium in Photo-Engraving and Printing. *Light Metals,* v. 14, Feb. 1951, p. 82-89.

Present status in the U. S. (T9, Mg)

110-T. Duralumin H. Shuttering—Progress Report. *Light Metals,* v. 14, Feb. 1951, p. 92-93.

"Shuttering" is apparently a Brish term for the forms used in concrete work. Walls up to 12 ft., 6 in. high have been successfully poured. (T26; Al)

111-T. Application of Aluminum in Television. (In French.) Maurice Victor. *Revue de l'Aluminium,* v. 27, Dec. 1950, p. 469-472.

(T1, Al)

112-T. Furnaces With Metallic Resistance Elements. (In French.) **I. Properties and Application of Stainless and Refractory Alloys. II. Commercial Alloys for Elevated-Temperature Applications. III. Construction, Operation, and Pyrometric Control of Electrical-Resistance Furnaces.** Pierre Chevenard and Xavier Waché. **IV. Furnaces With Platinum or Iridium Resistors.** Pierre Fleury and Louis Hackspill. **V. Furnaces With Molybdenum or Tungsten Resistors Protected Against Oxidation.** Louis Hackspill. "Les hautes Températures et leurs Utilisations en Chimie, Vol. I" (Masson et Cie., Paris), 1950, p. 225-307.

Descriptive reviews. 88 ref. (T5, S16, SS, Pt, Ir, Mo, W, SGg-h)

113-T. Furnaces With Carbon Resistors. (In French.) Georges Chaudron and Léon Moreau. "Les hautes Températures et leurs Utilisations en Chimie, Vol. I" (Masson et Cie., Paris), 1950, p. 308-352.

Comprehensive review, including structure; physical and chemical properties of amorphous carbon and graphite; preparation of electrodes; utilization in electric furnaces; details of a wide variety of furnace designs; and applications of such furnaces. 79 ref. (T5, C)

114-T. Furnaces With Ionized Conductors. (In French.) J. L. Andrieux. "Les hautes Températures et leurs Utilisations en Chimíe, Vol. I" (Masson et Cie., Paris), 1950, p. 375-446.

Comprehensive review of two broad types: those utilizing fused-salt electrolysis and those with salt baths. Details of construction of a wide variety of types. Separate subsections are devoted to recovery of various metals and their alloys from their compounds by electrolysis. 375 ref. (T5, C23, J2)

115-T. High-Frequency Furnaces. (In French.) G. Ribaud. "Les hautes Températures et leurs Utilisations en Chimie, Vol. I" (Masson et Cie., Paris), 1950, p. 447-488.

High-frequency theory and its practical application in various industrial fields. Operating characteristics and different types. 26 ref. (T5)

116-T. Arc Furnaces. (In French.) A. Damiens and A. Morette. "Les hautes Températures et leurs Utilisations en Chimie, Vol. I" (Masson et Cie., Paris), 1950, p. 489-537.

A comprehensive review, covering theory, operating practice, furnace design, and applications. Principal results obtained by research using arc furnaces. 275 ref. (T5)

117-T. Dielectric-Loss Furnaces. (In French.) Maurice Descarsin. "Les hautes Températures et leurs Utilisations en Chimie, Vol I" (Masson et Cie., Paris), 1950, p. 626-649.

Theory and practice. Includes circuit and structural diagrams. Application to various commercial purposes. 11 ref. (T5)

118-T. Electric Furnaces Operating Under Pressure. (In French.) M. Picon. "Les hautes Températures et leurs Utilisations en Chimie, Vol. I" (Masson et Cie., Paris), 1950, p. 650-686.

Different types and their theoretical bases. Fields of application. 46 ref. (T5)

119-T. Furnaces for Heating in a Vacuum or in an Inert Atmosphere. (In French.) Georges Chaudron and Léon Moreau. "Les hautes Températures et leurs Utilisations en Chimie, Vol. II" (Masson et Cie., Paris), 1950, p. 687-755.

Existing types, their structural and operational characteristics and fields of application. 72 ref. (T5)

120-T. Radiation Furnaces. (In French.) Henri George. "Les hautes Températures et leurs Utilisations en Chimie, Vol. II" (Masson et Cie., Paris), 1950, p. 756-775.

Theoretical bases and design of electrical radiation furnaces, usually with graphite radiation units. Particular fields of application. 17 ref. (T5)

121-T. Selection of Sintered Carbide Cutting Tools. *Steel,* v. 128, Mar. 12, 1951, p. 113, 116, 118.

(T6, C-n)

122-T. Highlights of AREA Research Activities. G. M. Magee. *Railway Age,* v. 130, Mar. 12, 1951, p. 58-61.

Work of past year has included studies on shelly rail, failures in rail and joint bars, tie wear, train speeds on curves, impact on bridges, fatigue of wood stringers, and roadbed stabilization. (T23, ST)

123-T. Carbide Proving Ground. *Wood,* v. 6, Mar. 1951, p. 18-19.

Saw grinding savings in labor amounted to $109; production is up 5% at Red Lion Cabinet Co. Cutterhead grinding savings were $188 yearly and stock savings amounted to $30 daily. (T29, T6, C-n)

124-T. Data on Stainless Steel Store-Front Design. Richard E. Paret. *Progressive Architecture,* v. 32, Mar. 1951, p. 93-97.

(T26, SS)

125-T. Interchangeable Die Cast Parts Modernize Line of Microscopes. *Die Castings,* v. 9, Mar. 1951, p. 26-28, 62.

Bausch & Lomb Optical Co., Rochester, N. Y., has replaced a number of sand-cast and stamped parts with Al and Zn die castings. (T8, Al, Zn)

126-T. Chrome Plating on Aluminum Opens New Fields. *Die Castings,* v. 9, Mar. 1951, p. 30-32.

Use of Cr-plated Al die castings in stringed instruments to replace the traditional wood. (T9, L17, Al, Cr)

127-T. Selection of Gear Materials. C. R. Austin. *Machine Design,* v. 23, Mar. 1951, p. 157-160.

Results of studies of gear-tooth surface stresses under specified contact conditions based on investigations of Meehanite metal. (T7, Q25, CI)

128-T. High Temperature Service With Austenitic Steels. M. E. Holmberg. *Petroleum Processing,* v. 6, Mar. 1951, p. 256-261.

Experience in the petroleum-refining industry shows there are other factors besides tensile, creep, and stress-rupture to consider. In many applications there is no advantage in using stabilized grades. A spheroidizing heat treatment is generally effective where stabilized steel is required. Low thermal conductivity and high coefficient of expansion are responsible for many of the failures, especially where thermal shock

and thermal fatigue are involved. (T29, Q general, AY, SS, SG-h)

129-T. A New Metal for Farm Tool Components. H. L. Geiger and H. W. Northrup. *Agricultural Engineering,* v. 32, Mar. 1951, p. 143-147.

Refers to ductile cast iron. Properties, microstructure, and agricultural applications. (T3, CI)

130-T. Aspects in the Design and Manufacture of Planar Grids for Triodes at U.H.F. W. J. Pohl. *Electronic Engineering,* v. 23, Mar. 1951, p. 95-99.

Calculation of maximum wire length; a method of measuring residual wire tension; mesh grids; manufacture by electrical resistance welding; and design of ring grid frames. Materials are usually tungsten or molybdenum. (T1, K3, W, Mo)

131-T. Durability of Aluminium and Its Alloys—The Food Industry. *Light Metals,* v. 14, Feb. 1951, p. 97-102.

Suitability of Al when exposed to those forms of chemical attack encountered in the food, brewing, dairy, and allied industries. (To be continued.) (T29, R5, Al)

132-T. Aluminium Survey Vessel "Ain-Al-Bahr." *Engineering,* v. 171, Feb. 16, 1951, p. 188-189; **Survey Launch "Ain-Al-Bahr."** *Engineer,* v. 191, Feb. 23, 1951, p. 260-262.

A 60-ft. cabin cruiser. Details of construction and design. (T22, Al)

133-T. (Book) Les hautes Temperatures et leurs Utilisations en Chimie. (High Temperatures and Their Utilization in Chemistry.) 2 vols. P. Lebeau and F. Trombe, editors. 1397 pages. 1950. Masson et Cie., 120 Blvd. St.-Germain, Paris 6, France.

Consists of 36 articles by 32 different French scientists covering various types of furnaces, their control, and various refractory metallic and nonmetallic materials used in construction of such furnaces. Individual articles of metallurgical interest are separately abstracted. (T5, S16)

134-T. A 4000° Furnace. W. E. Few and G. K. Manning. *Metal Progress,* v. 59, Mar. 1951, p. 364-365.

In a study for ONR of the solubility limits of O_2 and C in Mo, it was necessary to build a metallurgical furnace capable of operating as high as 4000° F. The furnace filled the requirements both from the standpoint of ease of maintenance and of adequate temperature control. The heating element is a tube, 13 in. long and ¾ in. diam., made of 0.005-in. Mo sheet. Surrounding this element are a number of radiation shields, also of 0.005-in. Mo. The entire assembly is enclosed within a vacuum-tight, water-cooled steel shell. (T5, Mo)

135-T. Conservation of Critical Raw Materials. *Tele-Tech,* Apr. 1951, p. 39, 72, 74.

Design changes made by RCA and Philco to effect savings in TV-receiver manufacture. Charts indicate savings in Al, Cu, Si steel, Alnico, and NiZn ferrite. Claims that performance of the new sets is as good as that of the old. (T1, Al, Cu, SG-n, AY)

136-T. New Tower Design Incorporates Corrosion Resistant Crossarms. *Electric Light and Power,* v. 29, Mar. 1951, p. 76-80.

Use of Al-alloy crossarms on high-voltage transmission lines in industrial areas where frequent painting is required. (T1, Al)

137-T. Fighter Wing Redesigned for Magnesium. D. H. Black. *Iron Age,* v. 167, Mar. 29, 1951, p. 90-92.

Experimental wings of thick Mg sheet made by East Coast Aeronautics and successfully applied to the Lockheed F80C. This construction eliminates many stiffeners, will save manufacturing time, and carries 30% more fuel. (T24, Mg)

138-T. No Backlash With This Aluminum Fishing Reel. *Modern Metals,* v. 7, Mar. 1951, p. 50. (T10, Al)

139-T. The Truth About Magnesium. George W. Orton. *Modern Metals,* v. 7, Mar. 1951, p. 52-53.

An Air Force captain takes issue with some arguments against the use of Mg. Cites examples of successful use. (T24, Mg)

140-T. Materials at Work. *Materials & Methods,* v. 33, Mar. 1951, p. 84-86.

Hearing-aid electron-tube grids (nickel); electroformed Ni dies for aircraft parts; Mg safety tongs; giant alloy steel forging for ore crusher; nickel-silver gage pointer; and several uses of non-metals. (T general, Ni, Mg, Cu, AY)

141-T. Alternate and Substitute Materials for Electrical Equipment and Parts. *Materials & Methods,* v. 33, Mar. 1951, p. 107.

Opposite 55 categories of electrical equipment and parts are shown "former material" and "substitute material". Includes structural parts, magnet materials, contact materials, resistance materials, conductors, solders, thermocouple alloys, thermostat elements, etc. (T1, SG-a,f,n,p,q,r,s)

142-T. The Man Who Doomed Whiskers. A. W. Martinez. *Steelways,* v. 7, Mar. 1951, p. 24-27.

Procedures and equipment for

production of razor blades. Includes history of the development of the industry, first by Gillette, then by Gem, Schick, and others. Processes include slitting, honing, lacquering, heat treating, and inspection.
(T6, G15, G19, ST)

143-T. The Production of Motors for 3.5-In. Rocket Projectiles. *Machinery* (London), v. 78, Mar. 8, 1951, p. 386a-386L.

Miscellaneous fabrication equipment and procedures. Includes machining, forming, heat treatment, and welding. Material is a low-alloy Cr-Mo steel.
(T25, G general, AY)

144-T. B.S.A. Cast Milling Cutters. *Machinery* (London), v. 78, Mar. 15, 1951, p. 451-453.

Production from an alloy steel containing 1.3% C and 13% Cr, plus small amounts of W and V. Performance data. Micrograph shows uniform spheroidized structure obtained. (T5, G17, AY, TS)

145-T. Pit-Props in Aluminium Alloy. *Light Metals,* v. 14, Feb. 1951, p. 66-72; Mar. 1951, p. 126-129.

First section of a summary of current ideas and conclusions on the subject, by authorities in Germany and Great Britain. Begins with a condensed version of a paper by Hoevels, *Glückauf,* v. 85, 1949, p. 925, describing use in Ruhr mines. Compares mechanical and physical properties of steel and duralumin. Second part gives details of British investigations. (T28, Al)

146-T. Melbourne—The Royal Show. C. Homer Fraser. *Light Metals,* v. 14, Mar. 1951, p. 151-153.

Survey of Australian uses of Al and its alloys, as exhibited at a recent show. (T general, Al)

147-T. Packaging on Show. *Light Metals,* v. 14, Mar. 1951, p. 154-157.

Packaging uses of Al exhibited at Olympia, London, Jan. 30-Feb. 9, 1951. (T10, Al)

148-T. Experimental Work Operation of Electric Furnaces With Screen Insulation. (In Russian.) K. A. Valentinovich. *Promyshlennaya Energetika* (Industrial Power), v. 7, Dec. 1950, p. 6-8.

Experiments in which screen insulation replaces the standard brick structure with refractory lining. The brick walls are replaced by a series of thin screens of metal and ceramic material having air spaces between them. Results indicate that such furnaces heat up many times faster than ordinary furnaces, resulting in about 40% decrease of electric-power consumption and considerable reduction in maintenance costs. (T5)

149-T. Conservation of Critical Materials. *Electronics,* v. 24, Apr. 1951, p. 84-87.

Savings in Alnico, Al, brass, Cu, Co, Ni, steel, Sn, and Zn for television-receiver construction achieved by RCA and Philco, by use of substitute materials. Performance is said to be equal or superior to older models. (Tl, SG-n, Co, Al, Cu, Ni, ST, Sn, Zn)

150-T. Material-Saving Picture Tube. L. E. Swedlund and R. Saunders, Jr. *Electronics,* v. 24, Apr. 1951, p. 118-120.

Diagrams show how electrostatic-focus electron gun eliminated magnetic assemblies using critical Alnico-5 and Cu. Automatic correction of focus with line-volatge change or brightness adjustment is also provided. Focus voltage is obtained by rectification of pulses at the plate or the horizontal-deflection amplifier. (T1, Cu, SG-n)

151-T. Mixed Ferrites for Recording Heads. Robert Herr. *Electronics,* v. 24, Apr. 1951, p. 124-125.

Inexpensive ferrite heads show promise as substitutes for magnetic-recording units using critically short Ni. Advantages are simple construction with no laminations, minimized eddy-current losses at high frequencies, and reduced head wear in continuous-duty applications.
(T1, Ni, SG-n)

152-T. Critical Metals Usage Slashed in Revised Television Circuits. A. H. Allen. *Steel,* v. 128, Apr. 2, 1951, p. 78-81.

How Co has been eliminated and major economies effects in requirements for transformer steel, Al, Cu, Ni, and ferrites by Philco. Quality is said not have been reduced.
(T1, Co, Al, Cu, Ni, SG-n, p)

153-T. Trim Aluminum, Copper, Zinc Parts in Vacuum Cleaners. *Steel,* v. 128, Apr. 2, 1951, p. 83.

Substitution program.
(T10, Al, Cu, Zn)

154-T. Metallurgical Factors Affecting Drill-Collar Performance. P. J. Stoup. *Oil and Gas Journal,* v. 49, Apr. 12, 1951, p. 97-98, 100, 101.

Present manufacturing procedures for drill collars with special reference to metallurgical factors. Selection of steel, collar design, forming and heat treating procedures, methods for testing and inspection. (T28, ST)

155-T. Tantalum Partly Replaces Columbium Content of Electrodes. R. D. Thomas, Jr. *Iron Age,* v. 167, Apr. 5, 1951, p. 109-111.

Experimental results show that a new Type 347 welding electrode coating that conserves columbium

provides about the same tensile and stress-rupture properties, corrosion resistance and crack sensitivity. However, since both Cb and Ta are in short supply, Type 308 electrodes can often be substituted for both old and new stabilized types. (T5, K1, SS)

156-T. Engineers Seek Light on Strategic Materials. *SAE Journal,* v. 59, Apr. 1951, p. 54-58, 60.

Summarizes discussion of substitutes for scarce metals, at SAE National Passenger-Car, Body and Materials Meeting, Detroit, Mar. 6-8. (T21)

157-T. Aluminum Roof for Bridge Deck. *Engineering News-Record,* v. 146, Apr. 5, 1951, p. 41.

Use as replacement for galvanized sheet steel on Louisiana's Huey Long Bridge. (T26, Al)

158-T. The Story of High-Quality Electrodes. *Industry & Welding,* v. 24, Apr. 1951, p. 48-49.

Production by General Electric Co. (T5)

159-T. Meehanite Castings Find Wide Use in Steel Plants. C. E. Herington. *Steel,* v. 128, Apr. 9, 1951, p. 81-82.

Some current applications. Tables give physical properties of general engineering types and heat resisting types, also maximum working temperatures of the latter. (T5, CI)

160-T. The Use of Light Alloys for Mechanical Handling Equipment. J. N. Riley. *Machinery Lloyd* (Overseas Edition), v. 23, Mar. 17, 1951, p. 76-77, 79.

(T5, Al, Mg)

161-T. Aluminum in Hot Beds and Greenhouses (In French and German.) G. E. Huenerwadel. *Aluminium Suisse,* Jan. 1951, p. 13-16.

Several examples of Al application as framing material for the glass. (T26, Al)

162-T. Application of Corrugated Aluminum Sheets to Roofing and Sheathing (In French and German.) *Aluminium Suisse,* Jan. 1951, p. 32-34.

As applied to several large buildings. (T26, Al)

163-T. Cast Iron Containing Nodular Graphite as a Construction Material. (In German.) Adalbert Wittmoser. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, Jan. 21, 1951, p. 49-57.

Comparative experimental study of various iron alloys show that nodular cast iron combines valuable properties of gray iron with those of malleable iron and cast steel and thus is a suitable material for machine and engine construction. 36 ref. (T25, T5, Q general, CI)

164-T. Experience With Wing Burners for Heating Furnaces. (In German.) Friedrich Morawe. *Stahl und Eisen,* v. 71, Mar. 1, 1951, p. 244-246.

Use of the wing burner and its design; shows that it is superior from the standpoint of simplicity and inexpensiveness to many other types of burners. (T5)

165-T. Conserving Critical Materials. S. C. Spielman. *Electrical Manufacturing,* v. 47, Apr. 1951, p. 124-128, 256, 258.

How the radio and television industry have reduced use of Co, Ni, Al, Cu, and Zn by redesign. (T1, Co, Ni, Al, Cu, Zn)

166-T. Structural Rigidity With Die Cast Frames. *Die Castings,* v. 9, Apr. 1951, p. 21-22, 60-61.

Use of Zn and Al die castings to replace Fe and Al sand castings in photographic enlargers made by Elwood Pattern Works, Inc., Indianapolis. (T9, Zn, Al)

167-T. Die Cast Aluminum for Non-Magnetic Housing. *Die Castings,* v. 9, Apr. 1951, p. 23.

Application to fishing reels. Magnetic field controls backlash. (T10, Al)

168-T. Die Castings Featured in U. S. Industrial Design 1951. *Die Castings,* v. 9, Apr. 1951, p. 24-25.

A few illustrations from book, published by Studio Publications and Thomas Y. Crowell Co., New York. (T general)

169-T. Low Cost Hydraulic Fittings. *Die Castings,* v. 9, Apr. 1951, p. 26-28, 55-56.

Zn die castings in hydraulic fittings for auto jacks. (T7, Zn)

170-T. Brass-Plated Die Castings Withstand High Humidity. *Die Castings,* v. 9, Apr. 1951, p. 30-31, 54-55.

Nameplates and trim on refrigerators. 85-15 brass is applied to Zn-alloy castings. (T10, L17, Cu, Zn)

171-T. Designers Look to Stronger Airframe Materials. Leo Schapiro. *Steel,* v. 128, Apr. 16, 1951, p. 77-80.

Mechanical and fabrication properties which include new Cr-Mo steels, Ti, Al, and Mg alloys. (T24, Q general, AY, Ti, Al, Mg)

172-T. Carbide Insert Bits. A. J. Zinkl. *Mining Engineering,* v. 3, Apr. 1951, p. 312-314.

Results of 2-year test which led to adoption of carbide insert bits at Iron King mine, Shattuck-Denn Mining Corp., Humboldt, Ariz. Includes cost data. (T6, T28, Cn)

173-T. Production and Metallurgical Characteristics of Mining Hollow Drill Steel in Australia. Daniel Clark. *Metallurgia,* v. 43, Mar. 1951, p. 112-117.

Historical aspects of the change, including developments in hollow drill-steel manufacture, and present-day practice. Includes casting, sawing, drilling, rolling, welding, tensile testing, straightening, inspection, etc. Both carbon and alloy steels are used. (T28, CN, AY)

174-T. Certain Peculiarities of Thermistor Characteristics When Used as Elements in Nonlinear Circuits. (In Russian.) G. L. Polisar and L. V. Lokteva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 76, Jan. 21, 1951, p. 403-406.

Stability of volt-ampere characteristics with time. Different metals with high melting points were tested for use as incandescent wires in thermistors. New practical applications for thermistors. (T1, SG-h)

175-T. Problems of Production of Electrodes With High-Quality Coatings. (In Russian.) K. V. Petran. *Avtogennoe Delo* (Welding), v. 21, Dec. 1950, p. 7-10.

Dependence of chemical composition of metal deposited on particle sizes of coating materials; influence of physical characteristics of coating components on chemical composition of deposited metal; dependence of gas formation on time of contact of unpassivated complex ferro-alloys with liquid-glass solution; mechanical properties of deposited metal; and influence of different heating conditions on impact strength of deposited metal. (T5)

176-T. (Book) **Der Stahlhochbau.** (Steel Construction). Vol. I. C. Kersten. 234 pages. 1949. W. Ernst & Sohn, Berlin, Germany. 15.60 DM.

Detailed information on the materials used in steel construction, workshop practice, and site work. Drawings and diagrams deal with everything from the making of pig iron to the latest German standard specifications for bolts, nuts, screws, and rivets. Includes chapters on welding, riveting, and anti-corrosion measures. Machinery and equipment used in steel fabrication and structural enginering.
(T26, K general, S22, ST)

177-T. Peerless Gets 100% Greater Die Life With Harder Cores. Ralph L. Clark. *Western Metals,* v. 9, Apr. 1951, p. 35-36.

Change from a hobbing steel with carbon as low as 0.04% to a 4½% Cr air hardening hobbing steel resulted in improvement in life of dies for casting Zn alloy necktie clasps. (T5, E13, AY, Zn)

178-T. Stainless Steels in Pulp and Paper Equipment. H. O. Teeple. *Paper Industry,* v. 33, Apr. 1951, p. 52-54.

Application to mechanical sulfite, and sulfate pulping operations. Selection by corrosion resistant properties. (T29, R5, SS)

179-T. Progress in Polymetallic Plates. Herbert R. Leedy. *Modern Lithography,* v. 19, Apr. 1951, p. 35-39.

Ink repellance and attraction of different metal surfaces and the use of polymetallic plates in lithographic processes. Includes chart showing comparison of various metals for different processes. (T9)

180-T. Monument to Mankind. *Steel Horizons,* v. 13, Spring, 1951, p. 14-15.

Use of stainless steel in new United Nations Headquarters building. (T26, SS)

181-T. This Heart and Lung Machine May Save Your Life. *Steel Horizons,* v. 13, Spring 1951, p. 16-17.

Apparatus for use in medicine and surgery. Emphasizes use of stainless steel. (T10, SS)

182-T. They Shoot With Silver Nitrate. *Steel Horizons,* v. 13, Spring 1951, p. 18-19.

Use of stainless-steel developing tanks by Armed Forces combat photographers. (T9, SS)

183-T. Unusual Spring Alloy Solves Variable Temperature Problem. *Inco Magazine,* Spring 1951, p. 18-19, 27.

Use of Iso-Elastic alloy made by John Chatillon & Sons for instrument springs with low thermoelastic coefficient. (T8, Q21, Ni)

184-T. Tungsten Carbide Rolls for Cold Rolling Metals. R. T. Beeghly. *Iron and Steel Engineer,* v. 28, Apr. 1951, p. 74-78; disc. p. 79.

The above can be used at speeds double that of normal practice. Their use may require changes in operating practice such as amount of reduction, annealing cycle, roll shape, etc. (T5, F23, W, C-n)

185-T. Metallurgical Factors and Drill Collar Performance. R. J. Stoup. *Drilling,* v. 12, Apr. 1951, p. 30, 33.

Previously abstracted from *Oil and Gas Journal.* See item 154-T, 1951. (T28, ST)

186-T. Aluminum Windows for Canadian Weather. H. N. Acker. *Canadian Metals,* v. 14, Apr. 1951, p. 46.
(T26, Al)

187-T. Producing Hollow Steel Propeller Blades for Aircraft. *Machinery* (London), v. 77, Apr. 5, 1951, p. 550f-550L.

Procedures and equipment of Hamilton Standard Div., United Aircraft Corp., East Hartford, Conn. Cores and shells are high-alloy steel. Operations include machining, hot forming, seam welding, sand blasting, and lacquering.
(T24, G17, K general, L10, L26, AY)

188-T. Producing Parts for Nickel-Iron Storage Batteries. George E. Stringfellow. *Machinery* (London), v. 78, Apr. 12, 1951, p. 593-600.

Equipment and procedures of Thomas A. Edison, Inc. Rolling, forming and other press operations; automatic gas seam welding, machining, spot welding, and plating are among the processes employed. (T1, G general, K2, K3, L17, ST, Ni)

189-T. High Temperature Steels and Alloys for Gas Turbines. *Engineer,* v. 191, Mar. 9, 1951, p. 313-314; Mar. 16, 1951, p. 312-313; Mar. 23, 1951, p. 352; Mar. 30, 1951, p. 380-381; *Engineering,* v. 171, Mar. 9, 1951, p. 282-283; Mar. 16, 1951, p. 312-313; Mar. 23, 1951, p. 352; Mar. 30, 1951, p. 380-381; *Aircraft Engineering,* v. 23, Mar. 1951, p. 78-82, 85; *Metallurgia,* v. 43, Mar. 1951, p. 119-126; **High-Temperature Steels; Symposium on Materials for Gas Turbines,** *Iron and Steel,* v. 24, Apr. 1951, p. 124-138.

Summarizes proceedings of Iron and Steel Institute Symposium. (T25, AY, SG-h)

190-T. Light-Alloy Supports. W. H. Evans. *Light Metals,* v. 14, Mar. 1951, p. 129-132; Apr. 1951, p. 172-180.

Some of the more important developments made in Britain during the past 5 years in application of Al alloys as roof supports in mines. (T28, Al)

191-T. Aluminium and General-Line Containers. *Light Metals,* v. 14, Mar. 1951, p. 139-147; Apr. 1951, p. 195-206. (Reprinted from *Aluminium Laboratories, Ltd.* (Banbury, England), Development Bulletin No. 12.)

Materials, plant techniques, and range of products. Concluding part: deep drawn containers and their fabrication. Includes impact extrusion of tubes and other containers. (T10, G5, Al)

192-T. Aluminium Fire Engine. *Light Metals,* v. 14, Apr. 1951, p. 180-181.

A fire engine in which Al construction has saved nearly a ton in weight. (T21, Al)

193-T. Magnesium Reflects 1851. *Light Metals,* v. 14, Apr. 1951, p. 184-185.

Re-creation in Mg alloy castings of the "Crystal Palace," originally built in 1851, using cast and wrought iron for intricate lacy arches and panels. (T9, T26, Mg)

194-T. Aluminium in Electrical Power Systems. (Concluded.) K. J. Smith. *Light Metals,* v. 14, Apr. 1951, p. 214-222.

Al conduit and Al-sheathed cable of different types. (T1, Al)

195-T. Minor Uses of the Light Metals. IV. Magnesium in Metallurgical Control. *Light Metals,* v. 14, Apr. 1951, p. 222-223.

Applications in refining of Cu and Ni. (T5, C21, Mg, Cu, Ni)

196-T. Fish-Storage Holds of Modern Trawlers. (In French.) Pierre Vidal. *Revue de l'Aluminium,* v. 28, Feb. 1951, p. 51-54.

Use of Al alloy sheets for lining trawlers, and their advantages. (T22, Al)

197-T. A Duralumin Bridge 95 Meters Long on the River Tummel. (In French.) Maurice Victor. *Revue de l'Aluminium,* v. 28, Feb. 1951, p. 56-57.

Bridge located in Scotland. Advantages of use of duralumin. (T26, Al)

198-T. An Extra-Thin Aluminum Watch. (In French.) *Revue de l'Aluminium,* v. 28, Feb. 1951, p. 59-60.

Watch designed by Swiss manufacturers. Most of the parts are of Al. (T9, Al)

199-T. Good Results With Duralumin in the Clock Industry; Duralumin Is Not Subject to "Oval" Wear and It Improves the Lubrication of Clock Movements. (In French.) Raoul Beyner. *Revue de l'Aluminium,* v. 28, Feb. 1951, p. 61-62.

(T9, Al)

200-T. A Light-Alloy Protective Helmet. (In French.) R. Robart. *Revue de l'Aluminium,* v. 28, Feb. 1951, p. 63-64.

(T2, Al)

201-T. Some New Applications of Light Alloys in Packaging and Bottling. (In French.) Pierre Prévot. *Revue de l'Aluminium,* v. 28, Feb. 1951, p. 65-71.

Restricted to Al and its alloys. (T29, Al)

202-T. Aluphot, A New Photographic Material. (In French and German.) Max Schenk. *Aluminium Suisse,* Mar. 1951, p. 61-63.

A new photographic process, in which the plate consists of Al coated with Al_2O_3 intermixed with Ag or Ag compounds and made light-sensitive by dipping in cold solutions. (T9, Al)

203-T. Aluminium Coins. (In French and German.) *Aluminium Suisse,* Mar. 1951, p. 64-65.

Trend toward use of Al and its alloys for coins. Examples from France, Italy, Rumania, Czechoslovakia, and other countries. (T9, Al)

204-T. Chromium Plated Light Metal Cylinders. (In German.) P. Riekert

and W. Hampp. *Metalloberfläche,* v. 5, sec. A, Mar. 1951, p. 33-37.

Experiences with different unprotected and protected light-metal cylinders. Experiments show that hard-Cr-plated cylinders greatly reduce the wear of the cylinder as well as the piston. Best results were obtained with the alloy "Hydronalium". 17 ref. (T25, Q9, L17, Al, Cr)

205-T. Aluminum Conductors From an Aircraft Manufacturer's Viewpoint. W. W. Schumacher. *Transactions of the American Institute of Electrical Engineers,* v. 69, pt. 2, 1950, p. 1335-1341.

See abstract of condensed version in *Electrical Engineering,* item 496-T, 1950. (T1, T24, Al)

206-T. Cold War Puts Heat on Metal Powder. John Kolb. *Iron Age,* v. 167, May 3, 1951, p. 95-99.

The shortage of Cu, together with this metal's relatively low melting point, has spurred the Ordnance Corps' interest in iron powder rotating bands for shells. This could prove a boon to the powder-metallurgy industry and its customers, present and potential. Methods of production. (T2, H general, Fe)

207-T. Gears. Kenneth N. Mills. *Machine Design,* v. 23, May 1951, p. 116-120.

Methods for improving the resistance of heavy-duty gearing to service damage. Various lubrication, wear, corrosion, design, stress, and mechanical-property factors. (T7, Q general)

208-T. Designing an Electrical Appliance to Utilize Production Possibilities of Diecastings. G. H. Koch. *Machine Design,* v. 23, May 1951, p. 127-131.

As applied to an electric fan. A die-cast Al alloy is used for motor housings. (T10, E13, Al)

209-T. Realistic Detail by Die Casting. *Die Castings,* v. 9, May 1951, p. 21-22, 71.

Use of Zn-alloy die castings for combination cigarette dispenser and coin bank. (T10, E13, Zn)

210-T. Stop-Off Core Gives Production Flexibility. *Die Castings,* v. 9, May 1951, p. 27-29.

Use of Zn-alloy die castings in hand-control brake valves for trucks. (T7, Zn)

211-T. Safety Assured. *Die Castings,* v. 9, May 1951, p. 30-31.

Use of Zn-alloy die castings in safety containers for flammable and combustible materials. (T10, Zn)

212-T. Special Hardware for Folding Door. *Die Castings,* v. 9, May 1951, p. 32-33, 70.

Use of Zn-alloy die castings. (T6, Zn)

213-T. Die Castings Meet Requirements for Signal Corps Contract. J. Ross. *Die Castings,* v. 9, May 1951, p. 34-36, 60.

Use of Al die castings and stampings for case of portable a.c.-d.c. vacuum-tube voltmeter. (T1, Al)

214-T. Lead-Alloy Power-Cable Sheath. Herman Halperin and C. E. Betzer. *Electrical Engineering,* v. 70, May 1951, p. 415-420.

Newly developed arsenical Pb alloys for sheathing of underground power cables were found to be superior to Cu alloys in the following respects: resistance to bending caused by thermal expansion, resistance to creep caused by internal pressures, and fracture life under tensile stress. (T1, Q general, Pb)

215-T. Modern Trends in Airframe Materials. Leo Schapiro. *Metal Progress,* v. 59, Apr. 1951, p. 511-515.

Trends over the past ten years. Tomorrow's needs. Mechanical properties of some new alloy steels and of Ti and one of its stronger alloys. (T21, Q general, AY, Ti)

216-T. High-Temperature Problems in Aircraft Jet Engines and Turbo-Superchargers. R. B. Johnson. *Metal Progress,* v. 59, Apr. 1951, p. 503-510.

Parts discussed are the combustion-chamber liner, the nozzle diaphragm partition, the turbine buckets; the tail cone on the jet engine; and the nozzle box, the nozzle diaphragm, the turbine wheel, and turbine buckets on the turbo-supercharger. Physical and mechanical properties of various metals and alloys; defective pieces are illustrated. (T25, P general, Q general, SG-h)

217-T. Ductile Iron Replaces Alloy Gear Castings, Forgings. J. D. Sheley. *Iron Age,* v. 167, May 10, 1951, p. 99-100.

Ductile iron has been found to be an excellent substitute for alloy steel castings and forgings in paper machinery gears and other components. Heat treating gives tensile strengths up to 216,000 psi. and hardness over 400 Brinell. (T7, Q27, Q29, CI)

218-T. Design and Manufacture of Pressure Vessels. *Petroleum,* v. 14, May 1951, p. 127-130, 143.

Manufacturers' and users' views on British Standard 1500/1949. Welding, plate bending, and radiographic inspection equipment. (T26, ST)

219-T. Tungsten Carbide and the Defense Program. M. L. McCormack. *Mining Congress Journal,* v. 37, Apr. 1951, p. 110-111.

Cost and materials savings made possible by use of the tungsten carbide in mining drill bits. (T28, W, C-n)

220-T. How Modern Stamping Techniques Can Help Conversion. James M. Leake. *Finish,* v. 8, May 1951, p. 23-26, 84.

Advantages of stamping. Various examples of stamped metal parts for military and nonmilitary applications. (T2, G3)

221-T. Magnesium in the World's Largest Bomber. *Magazine of Magnesium,* May 1951, p. 4-7.

Various uses in the B-36. (T24, Mg)

222-T. Aeronautical Research and Development Trends. Frederick R. Dent, Jr. *Magazine of Magnesium,* May 1951, p. 10-15. (Excerpts from address by Frederick R. Dent, Jr.)

Emphasis on uses of Mg and its alloys. (T24, Mg)

223-T. Farm Implements of Welded Construction. Colin Spencer. *Welder,* v. 19, Oct.-Dec. 1950, p. 75-79.

(T3, K general)

224-T. Aluminium in Electrical Power Systems. K. J. Smith. *Light Metals,* v. 14, Feb. 1951, p. 73-79; Mar. 1951, p. 158-164; Apr. 1951, p. 214-222.

World-wide illustrated review. (T1, Al)

225-T. The Light Alloy Bow. A. J. Hipperson. *Light Metals,* v. 14, May 1951, p. 227-229.

Advantages for use in archery. (T10, Al)

226-T. All-Welded Brewery Vats. *Light Metals,* v. 14, May 1951, p. 229-231.

Use of Al alloys. (T29, Al)

227-T. Aluminium at the British Industries Fair—1951. *Light Metals,* v. 14, May 1951, p. 233-267.

Enumeration, classification, and description of plant and equipment of interest to suppliers and users of light and ultra-light alloys in all forms. Pure applications of the metals are dealt with under one common subsidiary grouping. Actual users of the metals are indicated. (T general, Al, Mg)

228-T. Parlanti Process. Conrad Parlanti. *Light Metals,* v. 14, May 1951, p. 270-272.

Development of Al molds for casting irons and steels. Advantages of this material over conventional materials. (T5, E12, Al, CI)

229-T. Summary of the Advantages of Light Alloy Connecting Rods in Automobile Engines. (In French.) René Calais. *Revue de l'Aluminium,* v. 28, Jan. 1951, p. 12-16.

Advantages of weight reduction and improvement in mechanical efficiency. (T21, Al)

230-T. Weight Reduction of Mine Skips and Cages All Over the World. (In French.) Jean Reinhold. *Revue de l'Aluminium,* v. 28, Jan. 1951, p. 23-27.

Use of Al alloys in France, Germany, South Africa, and the U. S. (T28, Al)

231-T. Service Life of Light-Alloy Parts Used in the Construction of Freight Cars. (In French.) Jean Hérenguel. *Revue de l'Aluminium,* v. 28, Mar. 1951, p. 89-93.

Superior performance, as compared with ferrous metals. (T23, Al)

232-T. Light Yachting and Light Metal. (In French.) Th. De Saint-Pere. *Revue de l'Aluminium,* v. 28, Mar. 1951, p. 94-96.

Advantages of light metals for construction of small yachts. (T22, Al, Mg)

233-T. Commercial Vehicles (Trucks) in 1950. (In French.) Maurice Victor. *Revue de l'Aluminium,* v. 28, Mar. 1951, p. 97-101.

Emphasis on applications of Al and its alloys. (T21, Al)

234-T. Beryllium Copper Shoulders Defense Jobs. John T. Richards. *Steel,* v. 128, May 14, 1951, p. 83-84.

High-strength alloy in the form of castings, strip and wire is finding many military-equipment applications, particularly in control devices and instruments. (T8, T2, Cu)

235-T. Metallurgical Factors Affect Drill Collar Performance. R. J. Stoup. *Steel,* v. 128, May 14, 1951, p. 90, 92, 94, 97.

Previously abstracted from *Oil and Gas Journal.* See item 154-T, 1951. (T28, ST)

236-T. New Roofing Material Used on the South Bank Exhibition Site for the Thameside Restaurant. *Sheet Metal Industries,* v. 28, May 1951, p. 462.

The material used is an aluminum cork sandwich insulated panelling. This material is claimed to have several advantages. (T26, Al)

237-T. Steel Supports in Mines. (In German.) Karl Gross. *Berg-und Hüttenmännische Monatshefte,* v. 96, Mar. 1951, p. 42-49.

Regardless of initial cost, longer life and possibility of reuse makes steel a more economical material than wood for this purpose. (T28, CN)

238-T. The State of the Art of Utilizing Rhenium Metal and Its Alloys. (In German.) W. Kleese. *Metall,* v. 5, Apr. 1951, p. 155-156.

Present and proposed uses. (T general, Re)

239-T. (Book) Jet Aircraft Power Systems. Jack V. Casamassa, editor. 338 pages. 1950. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18.

Traces the history and development of the jet: its design, theory, and operation, including service, maintenance, and inspection. Includes chapter on materials for gas-turbines. (T25)

240-T. Engineering Developments in Aircraft Production. T. E. Piper. *Automotive Industries,* v. 104, May 15, 1951, p. 34-38, 144, 146.

Includes welding of Al and Mg, stretch forming, extrusion, fabrication of plastics, and glass-fiber laminates.
(T24, K general, G general Al, Mg)

241-T. New Electrodes for Inert-Gas Welding Arcs. J. D. Cobine and C. J. Gallagher. *Electrical Engineering,* v. 70, June 1951, p. 504. (A condensation.)

Includes a diagram of a normal W electrode and photographs of cathode spots on ⅛ in. diam. electrodes of pure W, zirconia-coated W, a thoria core in a sintered W tube, a thoria core in a Cu tube, and a sintered W-thoria electrode are given. (T5, K1, W, Th)

242-T. Engineering Materials in Ordnance Equipment. Benjamin S. Mesick. *Materials & Methods,* v. 33, May 1951, p. 59-63.

Major applications of engineering materials in our military equipment, and some of the current problems now facing the Ordnance Corps.
(T2)

243-T. New Developments Expand Use of Lead Construction. Kempton H. Roll. *Materials & Methods,* v. 33, May 1951, p. 69-73.

Sheet lead construction, testing of lead linings and welds, brick and lead linings, bonded lead linings, lead piping and coils, and bonded and lead-covered pipe. (T29, Pb)

244-T. Oil-Pocket Metal Powder Bearings Improve Self-Lubricating Qualities. John Haller. *Materials & Methods,* v. 33, May 1951, p. 80-81.

Interior cavities filled with lubricant prolong bearing life and practically eliminate "freezing" under many adverse operating conditions. The various types and their applications. (T7, H16)

245-T. Europe Studies Tinplate Substitutes. W. G. Cass. *Materials & Methods,* v. 33, May 1951, p. 132, 134, 136, 138.

Reviews recent work in Germany and England.
(T general, Sn, ST)

246-T. The Use of Aluminum in Petroleum Refinery Equipment. E. E. Kerns and W. E. Baker. *Petroleum Refiner,* v. 30, May 1951, p. 123-129.

Some refinery installations of Al in tanks, exchangers, instrument tubing, and insulation weatherproofing. Value of Al as an economical construction material for refinery equipment. Data on mechanical properties, corrosion experience, etc. 12 ref. (T29, Al)

247-T. You Can Save Alloy Steel by Substituting Carbon Grades and by Using Leaner Alloys. P. D. McElfish. *Western Metals,* v. 9, May 1951, p. 29-31.

Possible substitutions and specific recommendations.
(T general, CN, AY)

248-T. Great Care Needed to Produce Resistance Welding Electrodes. Ray J. Thompson. *Western Metals,* v. 9, May 1951, p. 39-40.

Procedures and equipment of Ampco Metal, Inc., at its Burbank, Calif., plant. (T5, K3)

249-T. The Manufacture of Ring Travelers for the Textile Industry. Reed Collins. *Wire and Wire Products,* v. 26, May 1951, p. 390-392.

Parts are of several types, either bronze or steel. Material specifications and fabrication operations, including rolling, finishing, heat treatment, finishing, inspection, etc.
(T29, Cu, ST)

250-T. Accessory Manufacture; The Production Methods at the Works of Wilmot Breeden Ltd. *Automobile Engineer,* v. 41, May 1951, p. 171-181.

Miscellaneous procedures and equipment of British firm. The main products are bumpers, locks, window regulators, handles, steering wheels, and interior fittings for automobiles. Includes machining and presswork, heat treatment, form rolling of bumpers, shearing, piercing, polishing and plating, assembly and inspection. (T21)

251-T. Some Problems in the Manufacture of Experimental Gas Turbines. L. H. Leedham. *Institution of Mechanical Engineers, Proceedings,* v. 163, W.E.P. No. 61, 1950, p. 281-290; disc., p. 290-293.
(T25, G general)

252-T. Aluminum Pipe in Low Coal. *Coal Age,* v. 56, June 1951, p. 81.

Use of Al pipe in mines of the New River Co., in Fayette and Raleigh counties, W. Va. Light weight and easy handling reduce labor cost and more than offset extra cost in low coal seams.
(T28, Al)

253-T. How to Frame a Glass Enclosure. *Die Castings,* v. 9, June 1951, p. 21, 59-60.

Use of die-cast Zn for the frames of glass-covered areas on meters, dials, gages, etc. Specific application is a gasoline pump. (T8, Zn)

254-T. Some Considerations in the Design of Handles and Knobs. *Die*

Castings, v. 9, June 1951, p. 23-24, 60-62.
Various types of die-cast Zn and Al handles, knobs, etc. (T6, Al, Zn)

255-T. Combination of Materials for Jewelry Effects. *Die Castings*, v. 9, June 1951, p. 25-26, 63.
Two examples of the way in which die-cast Zn with brilliant Cr plate can be used to advantage in combination with stamped brass or molded plastic are: the knob for a beer dispenser and the Lincoln horn assembly. (T10, Zn)

256-T. Die Castings Cut Overhead Costs. *Die Castings*, v. 9, June 1951, p. 28-30, 58.
Applications of Al die castings in cloth-cutting machines. (T29, Al)

257-T. Complex Sand Core Eliminated by Die Casting. H. E. Earl and G. R. Wolter. *Die Castings*, v. 9, June 1951, p. 32-34, 57-58.
Analysis of savings made by substitution of die-cast Al for cast iron in fan housings for a blower used in connection with oil burners. (T7, Al)

258-T. Metal-and-Plastics in Product Design. John Delmonte. *Electrical Manufacturing*, v. 47, June 1951, p. 98-101, 254, 256, 258.
Partnership of both classes can be exploited by intelligent product design, not only to enhance appearance but to provide engineering properties otherwise not obtainable; in some instances intimate compounds of metals and plastics provide entirely new materials. (T general)

259-T. Conductive Materials for Elevated Operating Temperatures. John T. Richards. *Electrical Manufacturing*, v. 47, June 1951, p. 128-129, 270, 272.
In specifying a material for current-carrying components, consideration should be given to possible effects of temperature rise. Heating may result from current passage, conduction from mating parts, or operation in a warm atmosphere. The influence of temperature on several mechanical and physical characteristics of Cu, brass, bronze, and beryllium-copper is presented graphically. (T1, P general, Q general, Cu)

260-T. Breeding Ground for Navy's Firepower. *Steel*, v. 128, June 11, 1951, p. 79-81.
Some equipment and procedures in design, development, fabrication and testing of ordnance equipment at Naval Gun Factory, Washington. (T2)

261-T. Stainless Steel Vital to Aircraft Research. *Steel*, v. 128, June 11, 1951, p. 86, 89.
Use of stainless steel plates to line NACA's supersonic wind tunnel for testing engines under simulated high altitudes. (T24, SS)

262-T. Selecting and Processing Steels for Lamination Dies. Lester F. Spencer. *Tool Engineer*, v. 26, May 1951, p. 25-27; June 1951, p. 42-44.
Compositions and punching properties of various grades of electrical steel sheet. Annealing recommendations to minimize strains due to the punching operation. These strains have an adverse effect on electrical properties. Die specifications, including tolerances, compositions, and wear resistances. (T5, G2, TS, AY)

263-T. Production Evaluation of Cutting Tool Materials. Thomas Badger. *Tool Engineer*, v. 26, June 1951, p. 31-34.
Technical factors to be considered in selecting cutting tool materials. Includes design limitations. (T6,TS)

264-T. Aluminium and Its Alloys in the Chemical and Processing Industries. S. M. Lawrence. *Industrial Chemist and Chemical Manufacturer*, v. 27, May 1951, p. 219-224.
Some of the more recent developments in the utilization of Al and its alloys as materials of construction. Data on installation, operation, and maintenance. (T29, Al)

265-T. Cast Iron for Glass Making Molds. (In French.) Jean Guillamon. *Fonderie*, Feb. 1951, p. 2373-2374.
Several types of cast iron particularly adaptable for production of molds for glass. Compositions of these cast irons. (T29, CI)

266-T. Automobile-Engine Cylinders of Chromium-Plated Aluminum. (In French.) *Revue de l'Aluminium*, v. 28, Apr. 1951, p. 131-135.
Replacement of engine cylinders with cast iron sleeves by Cr-plated Al cylinders is said to offer several advantages in efficiency, weight, and price. Technique of Cr-plating Al. Improvement in thermal con ductivity between piston and cooling fluid resulting from use of Al cylinders. (T21, Al, Cr)

267-T. Saoutchik Makes a Light-Alloy Automobile for the Present King of Arabia. (In French.) *Revue de l'Aluminium*, v. 28, Apr. 1951, p. 136-137.
Custom-built car made by a French manufacturer. (T21, Al)

268-T. "As-de-Trefle" Presents: Photography on Aluminum Using the "As-Alu" Sensitive Surface. (In French.) *Revue de l'Aluminium*, v. 28, Apr. 1951, p. 138.
Billboard size "cheesecake" photograph illustrates possibilities of process developed by a French company. An Al sheet, after undergoing a spe-

cial surface treatment, receives a coating of silver bromide. This sensitive surface is prepared in different sizes and emulsion grades, with a white or metallic underlayer. (T9, Al)

269-T. Material for Laboratory and Industrial Control Equipment. (In French.) Raymond Guillemot. *Revue de l'Aluminium,* v. 28, Apr. 1951, p. 139-142.

Various new developments in application of Al and its alloys. (T8, Al)

270-T. Aluminum Roof for the Cincinnati Railway Station. (In French.) *Revue de l'Aluminium,* v. 28, Apr. 1951, p. 146-147.

Roof is in the shape of a semispherical dome. Details of construction. (T26)

271-T. Figureheads for the Bow. (In French.) Pierre Vidal. *Revue de l'Aluminium,* v. 28, Apr. 1951, p. 148-151.

Various examples of revival of an old custom. Figureheads for ships' bows are made of cast light alloys with protective coatings. (T22, Al)

272-T. The Arvida Bridge. (In French.) C. J. Pimenoff. *Revue de l'Aluminium,* v. 28, Apr. 1951, p. 153-164.

Details of Canadian suspension bridge made entirely of Al alloys, its design and construction. (T26, Al)

273-T. Alloy Aluminum for Automobile Bodies. *SAE Journal,* v. 59, June 1951, p. 35-39, 46. (Based on "A Modern All-Aluminum Body Development for Production" by E. C. DeSmet. J. H. Dunn, E. J. Zulinski, and C. J. Schmidt.)

A joint research group organized on a cooperative basis engineered and built a complete automobile body to determine what could be done with Al in body structures. Advantages and disadvantages of three possible alloys. Fabrication problems in forming, welding, and finishing, as well as design for rigidity equal to steel. (T21, Al)

274-T. Bus Bars of Aluminum Saved Kaiser 70%. F. W. Douville. *Welding Engineer,* v. 36, June 1951, p. 22-25.

Use for the 7th potline of Kaiser's Al reduction plant near Spokane. The Al was made in this plant, and rolled to size and gage at a nearby Kaiser plant. How the bars were joined by inert-arc metal-arc welding. (T5, K1, Al)

275-T. Electrodes That Stabilize Inert-Gas Arcs. J. D. Cobine and C. J. Gallagher. *Welding Engineer,* v. 36, June 1951, p. 32-34.

See abstract under similar title appearing in *Electrical Engineering;* item 241-T, 1951. (T5, K1)

276-T. (Book) **Ordnance Production Methods.** Charles O. Herb, editor. 534 pages. 1951. The Industrial Press, 148 Lafayette Street, New York 13, N. Y. $10.00.

A collection of articles published in *Machinery* since 1939, describing manufacturing operations on rifles and small arms, machine guns, bullets, shells, cartridge cases, guns, bombs, tanks, and other weapons of war. (T2)

277-T. Aluminum Honeycomb Sandwich Construction. T. P. Pajak. *American Society for Testing Materials,* Preprint 117, 1951, 7 pages.

The combination of Al facings, Al core, and a specially developed adhesive results in a structural material with desirable high strength and rigidity characteristics. Advantages are uniform density, high specific strength, high shearing modulus, and resistance to environmental effects with constant strength under variable humidity and temperature conditions. (T26, K12, Al)

278-T. Aluminum Alloys in Heat Exchanger Construction. E. G. Kort and J. S. Hamilton. *American Society of Mechanical Engineers,* Advance Paper 50-A-123, 1950, 14 pages.

Corrosion resistance, ASME Code considerations, service history, and others of importance to the engineer. (T5, R general, Al)

279-T. Ductile Steel Tubing at Low Cost Replacement for Copper in Radiant Heating. *Architectural Forum: The Magazine of Building,* v. 95, June 1951, p. 206.

(T27, ST, Cu)

280-T. Heat Application Fundamentals. M. H. Mawhinney. *Industrial Heating,* v. 18, June 1951, p. 978-980, 982, 984, 986, 988, 990, 992, 994, 996.

Practical approach to heat balance, heat transfer, and burner capacity in industrial furnaces. Various furnace forms and early developments in industrial-furnace practice. Simplified formulas for computing heat loss, fuel required, and coefficient of convection in various furnaces. (T5, J general)

281-T. Schoolmasters Look at Aluminium. E. G. Woodiwiss. *Light Metals,* v. 14, June 1951, p. 355-358.

Report of light-metal handicraft work demonstrated at recent annual conference of the Institute of Handicraft Teachers (Middlesex Branch.) (T9, Al)

282-T. Saving Weight With Magnesium Housings. R. G. Gillespie. *Materials & Methods,* v. 33, June 1951, p. 78-80.

In applications where weight saving is worth the additional expense,

Mg can sometimes replace steel and Al in housing assemblies without loss of necessary strength. (T7, Mg)

283-T. Characteristics and Applications of Standard Aluminum Rivet Alloys and Tempers. *Materials & Methods,* v. 33, June 1951, p. 105.

A data sheet. (T7, Al)

284-T. Use of Finely Divided Metals in Explosives. D. Hart and W. R. Tomlinson, Jr. *Metal Progress,* v. 59, June 1951, p. 788-792.

Utilization of powdered metals in high explosives, pyrotechnics, propellants, and primers. Use of Mg for incendiary bombs and flares. Explosives containing powdered metals, principally Al, were also used in mines, grenades, and large shells. Mg-Al alloys, Zr, Ni, Ti, Si, Fe, Mn, Zr-Ni alloys, and the hydrides of Zr and Ti are used in various ways. Method of incorporation (dry blending or as a fluid slurry), performance properties, and safety precautions. Pertinent properties of 13 metallic elements used in military ammunition are tabulated. (T2, Al, Mg)

285-T. Saving Precious Alloys by Intelligent Use of Alternatives. *Metal Progress,* v. 59, June 1951, p. 817-830.

Transcript of a panel discussion of Western Metal Congress, Oakland, Calif., Mar. 21, 1951. Refers only to ferrous metals and their alloying ingredients.
(T general, AY, ST)

286-T. Future Sales Will Dwarf Aluminum Window Industry's Spectacular Postwar Gains. F. L. Church. *Modern Metals,* v. 7, June 1951, p. 23-27.

Various types, and their advantages. (T26, Al)

287-T. Model 20 Trailer Carries an Extra Ton of Freight. *Modern Metals,* v. 7, June 1951, p. 29-30.

Trailer made entirely of Al by Highway Trailer Co., Edgerton, Wis. One of the chief manufacturing problems encountered was solved by having two important curved parts contour formed. A saving of $20,000 in die costs and $14.00 per trailer, was thus realized. (T21, G6, Al)

288-T. Smart Redesign of a Coffeepot Cuts Manufacturing Cost 35%; Boosts Sales 3-Fold in a Year. *Modern Metals,* v. 7, June 1951, p. 32.

Emphasis on the use of Al.
(T10, Al)

289-T. Sea-Going Aluminum; Applications in Big New Liner and Torpedo Boats. *Modern Metals,* v. 7, June 1951, p. 50.

(T22, Al)

290-T. Design and Fabrication of Steam Piping. A. W. Rankin and R. W. Clark. *Welding Journal,* v. 30, June 1951, p. 508-522.

Selection of material, stress calculations and welding procedures in the design and welding of high-temperature steam piping.
(T27, K general, AY)

291-T. California's Proposed Fifteen-Million-Dollar All-Welded Freeway Viaduct in San Francisco. Leonard C. Hollister. *Welding Journal,* v. 30, June 1951, p. 523-528.

Reviews some of the prewar welded bridges, the use of welding in bridge construction during the war and the contemplated use of welding in above viaduct.
(T26, K general)

292-T. High-Strength Pressure Vessel. *Welding Journal,* v. 30, June 1951, p. 538-539.

Welded stainless-steel spherical storage chamber for use by the U. S. Air Force in rocket-propelled aircraft experiments.
(T26, K general, SS)

293-T. Tungsten Carbide Tipped Rock Drill Bits. J. C. Heaslip. *Canadian Mining and Metallurgical Bulletin,* v. 44, June 1951, p. 419-423.

Development, methods of attachment and various advantages.
(T28, C-n)

294-T. Aluminium-Alloy Aircraft Hangar. *Engineering,* v. 171, June 1, 1951, p. 654-655.

Hangar at the London airport.
(T26, Al)

295-T. Light-Alloy Rolling Stock for London Transport. *Engineering,* v. 171, June 8, 1951, p. 705-707.

Stresses and bending moments throughout the cars. (T23, Al)

296-T. Substitute Materials for Making Foudrinier Cloth. (In Polish.) E. Zalesinski. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 1, 1951, p. 65-73.

For the woven-wire mat used in papermaking, proposes use of Si-Mn bronze for the warp and Ni brass for the weft, as substitutes for Sn bronze, which is hard to get because of the Sn shortage. The new alloys meet all strength and corrosion resistance requirements. Conditions of melting and casting, two methods for plastic working: rolling, cutting out a spiral from plate, and drawing it; and rolling of a bar from round ingot and drawing to wire. Methods of welding and soldering wire cloth. Comparative corrosion data.
(T29, F28, K general, Cu)

297-T. Indium, Its Application and Possibility of Recovery From Metallurgical Products. (In Polish.) M. Schneider. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 1, 1951, p. 75-84.

Reviews literature on applications of In. Significance as an alloying

element for increased corrosion resistance. Also use in manufacture of jewellers' goods, metallic ornaments, dental alloys, and low-melting-point alloys. Contents of In in various Zn ores. In is recovered from Pb obtained as by-product in refining of Zn by New Jersey Zinc Co. Believes Pb obtained in Polish Zn works should contain more In than raw Zn or other by-products from Zn production. 40 ref.
(T general, C22, In)

298-T. Weather-Proof Windows of Die Cast Aluminum. *Die Castings,* v. 9, July 1951, p. 20-22.
(T26, Al)

299-T. A New Method of Joining Mitered Extrusions. *Die Castings,* v. 9, July 1951, p. 24.
Unique method of securing miter joints of Al extrusions for doors and windows depends upon the ductility of die-cast Zn angles.
(T26, Zn)

300-T. Design of a Portable Tool. *Die Castings,* v. 9, July 1951, p. 26-28, 53.
Redesign of portable electric saw from Mg sand castings to Al die castings. (T6, Al)

301-T. Small Air Cylinder Design. *Die Castings,* v. 9, July 1951, p. 31, 54.
Use of Al die castings in device made by Bellows Co., Akron, Ohio. (T25, Al)

302-T. Fluid Coupling Design. *Die Castings,* v. 9, July 1951, p. 32-34.
Use of Al die castings in fluid drives made by American Blower Corp., Detroit. (T25, Al)

303-T. Die Cast Worm and Helical Gearing. *Die Castings,* v. 9, July 1951, p. 19, 52-53.
Gearing used in a special typewriter lifting mechanism for office desks. Three Zn die castings are used. (T7, Zn)

304-T. Secondary-Emitting Surfaces in the Presence of Oxide-Coated Cathodes. S. Nevin and H. Salinger. *Electrical Communication,* v. 28, June 1951, p. 103-105.
Experiments show that the deleterious effect of oxide cathodes on secondary-emitting surfaces of Ag-Mg can be overcome by using Ta instead of Ni as the base metal for the oxide coating. 10 ref.
(T1, P15, Ta)

305-T. Making Electrical Contacts Stand Up in Control Service. Frank E. Reeves. *Electrical Manufacturing,* v. 47, Jan. 1951, p. 102-106, 204, 206, 208, 210, 212, 214.
How to design contacts to avoid early failure; advantages and limitations of available contact materials; steps to take in increasing contact life for both a.c. and d.c. circuits. (T1, SG-r)

306-T. Here Are the Details of the Preliminary Research and the Actual Laying of the First Experimental Aluminum Marine Pipe Line. Edward T. Wanderer. *Oil and Gas Journal,* v. 50, July 5, 1951, p. 58-59, 76.
(T4, Al)

307-T. New Vacuum Tube Materials. A. P. Haase and E. B. Fehr. *Tele-Tech,* v. 10, July 1951, p. 33-35.
Latest developments in Al-clad Fe as replacement for Ni as an anode material. (T1, Al, Fe)

308-T. Trade Names of Electrodes and Comparable AWS-ASTM Designations. *Welding Engineer,* v. 36, Mid-June 1951, p. 17.
A data sheet. (T5)

309-T. Trade Names of Resistance-Welding Electrode Alloys and RWMA Specifications. *Welding Engineer,* v. 36, Mid-June 1951, p. 18.
A data sheet. (T5)

310-T. Use of Aluminum Tuyeres. (In French.) M. Moutot. *Circulaire d'Informations Techniques,* v. 8, No. 5, 1951, p. 545-552.
Advantages with respect to durability and lightness. (T5, Al)

311-T. Aluminum-Base Bearing Alloys. (In French.) *Fonderie,* Mar. 1951, p. 2408-2409.
Composition as now prepared in various countries. (T7, Al, SG-c)

312-T. Evaluating the Design and Size of Regenerators. (In German.) Werner Heiligenstaedt. *Stahl und Eisen,* v. 71, May 24, 1951, p. 568-575.
Shows that the brick checker-work design is the most important factor in the efficiency of a regenerator, since its primary function is that of accumulating and storing heat. The shape of the wind channels is shown to be unimportant. Total efficiency of the regenerator is expressed by the ratio of utilized weight of brick to weight of blast per unit of time. (T5)

313-T. The Construction and Operation of Thoria Resistor-Type Furnaces. S. M. Lang and R. F. Geller. *Journal of the American Ceramic Society,* v. 34, July 1, 1951, p. 193-200.
Construction, operation, and approximate cost of furnaces heated with oxide resistors of the Nernst filament type consisting essentially of thoria. (T5)

314-T. Light Alloy Hangar at London Airport. *Metallurgia,* v. 43, June 1951, p. 295-296.
(T26, Al)

315-T. Aulgraph Trimetal Plate. Stanley E. Potter. *Modern Lithographer and Offset Printer,* v. 47, May 1951, p. 90-91, 93; June 1951, p. 113, 115, 117.
Development of above printing plate. The surface of the plate must

perform two different opposite tasks —to accept and retain grease and water, respectively. Hence, the plate has two metals in the surface and a third one as the base. Experiments made to determine the best metal for each purpose. (T29)

316-T. Stainless High Alloy Steels—Current Developments Affecting the Pulp and Paper Industry. J. M. Wilcox and James T. Gow. *Paper Trade Journal,* v. 133, July 13, 1951, p. 80, 82-84.

Commonly used designations for the different grades of high-alloy steels, with particular emphasis on the difference between wrought and cast grades. Sources of supply of the various elements and raw materials which go into high-alloy steels, and present availability or scarcity. Substitutions of more readily obtainable alloy steels for those grades which are now difficult to obtain are suggested for both acid and alkaline pulping processes. (T29, AY, SS, SG-g, h)

317-T. Festival of Britain: Light-Alloy Gangways Used in Festival Ship "Campania". *Sheet Metal Industries,* v. 28, July 1951, p. 675. (T22, Al)

318-T. Special Copper Alloys for Electrical Work. *Times Review of Industry,* new ser., v. 5, July 1951, p. 25-26.

Properties and applications. (T1, P15, Cu)

319-T. Molecular Distillation. (In French.) R. Gresillon. *Revue de l'Aluminium,* v. 28, May 1951, p. 186-187.

Use of Al for construction of apparatus for above process. (T8, Al)

320-T. New Light-Alloy Passenger Cars of the Belgian National Society of Local Trains. (In French.) Joseph Renglet. *Revue de l'Aluminium,* v. 28, May 1951, p. 188-192.

Details of construction from Al alloys. (T23 Al)

321-T. Where is Agriculture Going? *Revue de l'Aluminium,* v. 28, May 1951, p. 201-203.

Trends in agricultural machinery. Various applications of Al and its alloys in such equipment shown at a recent French fair. (T3, Al)

322-T. (Book) **Forschungshefte aus dem Gebiete des Stahlbaues, Heft 7. Uber den Einfluss hochfester Stähle auf Gewichtserparnis und Bauart im Stahlbrückenbau.** (Research in Steel Construction. Vol. 7. The Influence of High-Strength Steel on Weight Economy and Design in Steel-Bridge Construction.) O. Erdmann. 83 pages. 1950. Springer-Verlag, Germany. 10 Dm.

Theoretical considerations as well as structural and design characteristics involved in the use of certain low-alloy high-strength steels for the construction of bridges. The various structural members and also construction methods such as welding, are considered. (T26, ST)

323-T. Refractory Cermets. L. J. Cronin. *American Ceramic Society Bulletin,* v. 30, July 1951, p. 234-238.

Results of an investigation conducted to determine the suitability of refractory materials for use in special thermionic cathodes in vacuum tubes. Requirements for the cermet materials, produced by mixing, pressing, and sintering of oxides and metal powders. All available substances were tested and satisfactory cermet bodies were developed to meet these requirements. (T1, H general)

324-T. Some Notes on Cast Irons for Diesel Engines. W. G. Ure. *Australasian Engineer,* May 7, 1951, p. 73-77.

Metallurgical aspects of types of iron used in diesel engine manufacture. Main constituents of iron-carbon alloys. Effects of alloying elements. Includes photomicrographs. (T25, CI)

325-T. Forming Problems With Stainless Steel Sheet Metal. *Automotive Industries,* v. 105, July 15, 1951, p. 42-44, 130, 132.

Advantages and limitations to the use of stainless steel in aircraft manufacture. Describes various approaches to problems where half hard stainless sheet must be used. (T24, G general, SS, Al)

326-T. Latest Jet Engines Displayed at Paris Aviation Show. W. F. Bradley. *Automotive Industries,* v. 105, July 15, 1951, p. 45, 106, 108, 112, 114.

General characteristics of various jet engines displayed by various countries at the Paris aviation show. (T25)

327-T. Metal Windows; Large Scale Plant in Scotland. *Iron and Steel,* v. 24, July 1951, p. 331-333.

Operations and materials. Hot rolled mild steel is used; it is Zn plated, and painted. A method for sulphate recovery in the plant is described. (T26, L general, CN, Zn)

328-T. Producing M-47 General Patton Tanks at Baldwin-Lima-Hamilton. *Machine and Tool Blue Book,* v. 47, Aug. 1951, p. 213-214, 216.

Describes and illustrates the above, emphasizing the welding operation. (T2, K general)

329-T. How to Overcome Materials Shortages in Product Design and Manufacture. H. R. Clauser. *Materials & Methods,* v. 34, July 1951, p. 89-112, 112A-112H.

Suggestions on conserving or replacing specific scarce materials in metal fabricating industries. Where and how substitute materials can be used. Includes case histories and reference tables listing specific alternate materials for specific products. (T general)

330-T. Magnesium Alloy Star. *Metal Industry,* v. 79, July 13, 1951, p. 28-29.

A feature at the British festival. The structure was 40 ft. from tip to tip, 6 ft. in depth at the center and weighed 1790 lb. Methods of assembly and welding adopted for various portions of the structure. (T26, K general, Mg)

331-T. Aluminum's Role in Refinery Equipment. E. E. Kerns and W. E. Baker. *Oil and Gas Journal,* v. 50, July 19, 1951, p. 87, 98-99.

Several properties of Al which make it valuable for refinery equipment. 12 ref. (T29, Al)

332-T. The Acid Test for Stainless. *Steel Horizons,* v. 13, no. 3, 1951, p. 8-9.

Stainless steel barrels are a safe, efficient and cheaper container for handling acids and other corrosive materials. (T29, SS)

333-T. Stainless Feed Bag for the Rocket Planes. *Steel Horizons,* v. 13, no. 3, 1951, p. 14-15.

Design and fabrication of a stainless spherical storage tank for N_2 gas. (T26, T24, SS)

334-T. Production of Ozone With Refrigerated Anodes. E. I. Lash, R. D. Hornbeck, G. L. Putman, and E. D. Boelter. *Trend in Engineering at the University of Washington,* v. 3, July 1951, p. 13-16, 32.

By electrolysis of 40 wt. % perchloric acid with refrigerated platinum metal anodes, electrolytic ozone of 58 wt. % concentration has been prepared at energy efficiencies up to 24 g. ozone per kw-hr. The cells used for preparation of H_2-free ozone and a cell with internally cooled PT-Ir anode are described. (T1, PT, Ir)

335-T. Basic Coated Electrodes and Their Characteristics. H. F. Tremlett. *Welding & Metal Fabrication,* v. 19, June 1951, p. 224-228, July 1951, p. 259-264.

Properties of basic coated electrodes, their advantages and disadvantages, their handling characteristics, and metallurgical data. Believes that if basic coated electrodes could become the most generally used type substantial benefits to the welding industry would follow. (T5, K1)

336-T. Light-Metal Cylinders. (In French and German.) A. Von Zeerleder. *Aluminium Suisse,* May 1951, p. 88-92.

Reviews research and discusses the results obtained with a hard chromium plated Al engine cylinder. (T7, Al)

337-T. Powder Metal Gears Offer Economy Plus New Design Opportunities. Carl G. Levin. *Machine Design,* v. 23, Aug. 1951, p. 117-119.

Production data shows that powder-metal gears are economical. New design opportunities are offered. (T7, H general)

338-T. Well Handled for Casting. *Die Castings,* v. 9, Aug. 1951, p. 19, 62.

Application of Al die castings for bait-casting rod handles. (T10, Al)

339-T. 4 in 1. *Die Castings,* v. 9, Aug. 1951, p. 20-22.

Models of slide projectors made from one basic Al die casting. (T9, Al)

340-T. Close Tolerance on Concentricity. *Die Castings,* v. 9, Aug. 1951, p. 24-25, 61.

Use of Zn die castings for windshield-wiper motors. (T1, Zn)

341-T. Low Cost Power Transmission Elements. R. H. Schoening. *Die Castings,* v. 9, Aug. 1951, p. 27-28.

Use of Zn-alloy die castings. (T1, Zn)

342-T. Built for Durability. *Die Castings,* v. 9, Aug. 1951, p. 30-32.

Latches for walk-in refrigerators, constructed of die cast Zn, brass forgings, brass extrusions, and cold rolled steel. (T6, Zn, Cu, ST)

343-T. Helical Inserts Protect Threads in Die Casting. *Die Castings,* v. 9, Aug. 1951, p. 42-44, 62-63.

Use of stainless steel helical-wire thread in Al, Mg, and Zn die cast components for resistance to heavier loads, wear, corrosion, and vibration. (T7, SS)

344-T. Aluminum Masts for Radar. *Welding Engineer,* v. 36, Aug. 1951, p. 17.

High antennas to give a larger radius of radar detection are one of today's needs. The Navy is offsetting the greater weight by substituting Al for steel. (T1, Al)

345-T. High-Velocity Burners Cut Fuel Costs and Furnace Size. L. C. Peskin. *Iron Age,* v. 168, Aug. 9, 1951, p. 63-66; Aug. 16, 1951, p. 104-107.

A ram-jet burner which has reduced heating equipment volume as much as 75%, completely vaporizing and burning gas or liquid fuels. A non-luminous flame produces clean, soot-free convection heat—or heat plus special atmospheres. Burner may be used in connection with

reheating, continuous annealing, heat treating, ore beneficiation, and refining. Part II describes application of convection heating and the high-velocity burner to steelmaking and heat treatment. A drawing of a prototype continuous-strip annealing furnace is included. (T5)

346-T. Materials for Fastenings in Electrical Applications. Melvin N. Veeder. *Electrical Manufacturing*, v. 48, Aug. 1951, p. 120-121, 240, 242, 244.

Considerations in selecting the most suitable material. Applicable properties of various ferrous and nonferrous materials for this use. (T7, T1)

347-T. Bridging the Gap Between Iron and Steel. *Production Engineering & Management*, v. 28, Aug. 1951, p. 57-61.

Meehanite metal with high "as-cast" tensile strength, good machinability, adaptability to heat treatment, uniformity, and high freedom from defects is considered for some hard-to-get parts.
(T general, Q general, CI)

348-T. Association of Iron and Steel Engineers, Plain Bearing Recommended Practice. AISE Recommended Practice No. 1, April 29, 1951, (Tentative). C. E. Pritchard, chairman. *Iron and Steel Engineer*, v. 28, July 1951, p. PB1-PB37.

Correlates available data covering the fundamental requirements of good bearing practice, and all its many ramifications. Deals with design, operation, and maintenance of properly lubricated journal bearings. 23 ref. (T7, SG-c)

349-T. The Team Behind the Plow. George Laycock. *Steelways*, v. 7, July 1951, p. 8-11.

Miscellaneous applications of steel in farm equipment. (T3, ST)

350-T. Miracle in the Stock Yards. Robert West Howard. *Steelways*, v. 7, July 1951, p. 12-14.

Applications of stainless steel in equipment used to process by-products of the meat-packing industry. (T29, SS)

351-T. Steel Goes to Dinner. Ronald M. Deutsch. *Steelways*, v. 7, July 1951, p. 18-19.

Manufacture of stainless steel tableware. (T10, SS)

352-T. The Manufacture, Testing and Inspection of Turbine and Turbo-Alternator Rotors for Power Stations. H. H. Burton. *Metallurgia*, v. 44, July 1951, p. 22-28.

Various operations, from choice of steel, through ingot production, forging, and heat treatment to final inspection. Refers to some of the difficulties encountered. (T25, ST)

353-T. Materials and Performance. A. T. Bowden and W. Hryniszak. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 11-17.

The effect of using high-alloy steels upon the construction of the combustion chamber and heat-exchanger in the gas turbine in terms of high temperatures and high stresses, corrosion, erosion, scaling, etc. partly from experience gained with the Parsons experimental gas turbine. The influence of the material on the construction of the compressor. The choice of material is governed by the gas temperature, which is dependent on the required turbine inlet temperature.
(T25, Q general, SG-h, AY)

354-T. Gas-Turbine Performance and Materials. J. B. Bucher. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 17-23.

Some of the more urgent metallurgical problems for which the industrial gas-turbine designer awaits solutions. Information on creep resistance, weldability, and corrosion by vanadium pentoxide is given. Need for further research is stressed.
(T25, Q3, K9, R9, SG-h)

355-T. Some Proven Gas-Turbine Steels and Related Developments. D. A. Oliver and G. T. Harris. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 46-59.

Developments in special steels for jet engines. New long-time creep data for the austenitic steels up to 30,000 hr. Some considerations governing the choice and use of ferritic steels. Discusses steels for cast turbine casings and relaxation-resisting bolts. Influence of gas atmosphere composition on the oxidation and scaling of different steels. 21 ref.
(T25, Q general, SG-h, AY, SS)

356-T. Development of a High-Temperature Alloy for Gas-Turbine Rotor Blades. G. T. Harris and H. C. Child. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 67-80.

The general effect of the carbide-forming elements W, Mo, Cb, V, and Ti, the carbon content, and the composition of the base, on the creep strength at 750 to 800° C. of austenitic Ni-Co-Fe-Cr alloys, was investigated. An alloy suitable for gas-turbine rotor blades is Jessop G32, a Co-base alloy. The optimum heat treatment for this alloy. The nature of the phases which precipitation-harden some of the alloys was investigated by the carbide-extraction technique. (T25, Co, SG-h)

357-T. Chromium-Base Alloys for Gas-Turbine Applications. E. A. G. Liddiard and A. H. Sully. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 243-245.

Methods of producing Cr-base alloys. Difficulties encountered in all methods designed to remove O_2 from the metal and to prevent further contamination by O_2, N_2, or C. Creep properties, ductility, and other properties affecting their application. (T25, Cr)

358-T. Sweat-Cooling: A Review of Present Knowledge and Its Application to the Gas Turbine. P. Grootenhuis and N. P. W. Moore. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 281-288.

General mechanism. It is suggested that the properties necessary for a sweat-cooled component can best be provided by powder-metallurgy methods. Porosity vs. permeability and porosity vs. mechanical strength. Published data on properties of porous metallic compacts are reviewed. 47 ref. (T25, H general, SS, AY)

359-T. Future Needs in Materials for Land and Marine Gas Turbines. J. M. Robertson. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 293-303.

The factors that are important in relation to the performance of materials in gas-turbine components that operate at high temperatures; the making, shaping, and treating of these components; and their cost. Classes of material now being used, and likely to be used in the near future, in the production of gas-turbine components. (T25, SG-h)

360-T. Aluminum Bronze Valve Casings. (In French.) *Fonderie,* v. 64, Apr. 1951, p. 2447-2449.

Manufacture of above. (T7, Cu)

361-T. The Service of Metals in the Petroleum Industry. (In French.) B. Hedde d'Entremont. *Métallurgie et la Construction Mécanique,* v. 83, Apr. 1951, p. 271, 273, 275-276.

Various aspects, in particular the prevention of metal corrosion occurring in parts used in contact with petroleum fuels. (T28, T29, R7, ST)

362-T. The Use of Aluminum in the Construction of Swiss Railroad Cars With Pneumatically Tired Wheels. (In German and French.) R. Guignard. *Aluminium Suisse,* May 1951, p. 93-97; July 1951, p. 136-143.

Proposed light-metal designs; static stress tests. (T23, Al)

363-T. Aluminum in Metal Structures. (In French and German.) W. C. Devereux. *Aluminium Suisse,* July 1951, p. 144-153.

Experiences with aluminum buildings in different countries. Results of strength tests with a variety of structural Al profiles insure longer life and greater safety for Al structures. (T26, Q23, Al)

364-T. Materials of Construction for the Chemical Industry (Survey). Part I. Iron and Steel. Part II. Nonferrous Metals. (In German.) E. Franke. *Werkstoffe und Korrosion,* v. 2, May 1951, p. 173-181; July 1951, p. 249-258.

Surveys corrosion of stainless steels, austenitic Mg steels, Fe alloys with a high content of Si, heat resisting low-alloy steels, carbon steels, and cast iron, as well as their possibilities for use in the chemical industry. Part II discusses Cu, Al, Ni, Ti, Zr, Ta, and the noble metals. Reviews the literature. 255 ref. (T29, R general, Fe, Cu, Al, Ni, Ti, Zr, Ta).

365-T. Hot-Dip Zinc-Plating Tank of Pure Iron. (In German.) A. Kalpers. *Metall,* v. 5, July 1951, p. 290-291.

Under properly maintained conditions, above tank offers excellent service. The material contains only 0.15% of the usual impurities. (T5, L17, Fe, Zn)

366-T. Nickel Anodes. (In German.) Edm. R. Thews. *Metalloberfläche,* sec. B, v. 3, July 1951, p. B101-B107.

Use of cast, forged, rolled, sintered, and electrolytically produced anodes. Production methods for cast and rolled nickel anodes. (T5, E11, F23, Ni)

367-T. LeSabre Features Light Alloy Construction. *Automotive Industries,* v. 105, Aug. 15, 1951, p. 50-51.

Experimental automobile designed and built by General Motors. Al and Mg are used extensively throughout. (T21, Al, Mg)

368-T. Stalpeth Cable Sheath. R. P. Ashbaugh. *Bell Laboratories Record,* v. 24, Aug. 1951, p. 353-355.

Production and properties. Stalpeth is an improvement of Alpeth sheath, consisting of adding to the basic Alpeth design a terne-plated steel envelope, corrugated and formed so as to mesh intimately with the aluminum, and applied over it in a single manufacturing operation. The steel envelope is overlapped, and the seam is soldered by a novel process in which a thin flat ribbon of solder is inserted in the overlap of the corrugated metal. Induction heating is used to complete the seal. (T1, K7, ST, Al)

369-T. Substitution of Metals. *Chemical Age,* v. 65, Aug. 4, 1951, p. 156-158.

(From "A Bibliographical Survey of the Development and Use of Substitute Materials for Non-Ferrous Metals and Alloy Steels in Germany," Report No. RMS-2, His Majesty's Stationery Office, London.)

Summarizes results of German war research. (T general)

370-T. Some Interesting Experiments With Bi-Metallic Piston Skirts. *Diesel Power and Diesel Transportation,* v. 29, July 1951, p. 40-41.

Something new in pistons—skirts with an ⅛-in. thickness of Al bonded the full length of the cast iron trunk—is improving the performance of some of the large diesel engines in the power-generating plant of Freeport, Long Island. (T7, T25, Al, CI)

371-T. Some Considerations Involved in Selection and Casting of Babbitts. Robert V. Simpson. *Diesel Power and Diesel Transportation,* v. 29, July 1951, p. 44-47.

Advantages of No. 397 Ag babbitt, developed by Battelle during World War II, for use in place of the Sn-base "high-speed" babbitts, without sacrifice of service life or efficiency and with no cost penalty to the bearing user. This material consists essentially of approximately 3% Ag with a base of Sb and Pb. Babbitt metals, their characteristics, effects of various components on the alloys, and procedures for shell preparation, as well as casting procedure. (T7, SG-c, Pb, Sb)

372-T. Porcelain Enamel Selector Valve Cuts Maintenance. *Iron Age,* v. 168, Aug. 23, 1951, p. 74.

Aircraft fuel-selector valves must be operated totally dry over several thousand cycles without galling or excessive wear. Most of the possible metal choices fail in the extended dry-operation test. Stainless steel finished in porcelain provided the answer to this problem. (T7, Q9, SS)

373-T. Light Alloy Jibs. *Light Metals,* v. 14, Aug. 1951, p. 427-428.

Jibs applied to cranes for heavy engineering work. (T5, Al)

374-T. Round Trip—Hanover, Paris, Basle, Milan. *Light Metals,* v. 14, Aug. 1951, p. 429-434.

Varied new applications of aluminum observed during visits to trade fairs at above cities. (T general, Al)

375-T. More Festival Features. *Light Metals,* v. 14, Aug. 1951, p. 437-439.

Applications of Al at the Festival of Britain. (T general, Al)

376-T. Surface Line Rolling Stock. *Light Metals,* v. 14, Aug. 1951, p. 440-447.

Design and construction of an electric train largely of Al alloys. (T23, Al)

377-T. Duralumin Mine Skips and Cages. *Light Metals,* v. 14, Aug. 1951, p. 455-460.

(T28, Al)

378-T. The Progress and Future of Structural Aluminium. C. Marsh. *Light Metals,* v. 14, Aug. 1951, p. 465-468.

Includes welding and riveting procedures. (T26, K general, Al)

379-T. Magnesium is Non-Strategic; It Need Not Be Critical. *Magazine of Magnesium,* Aug. 1951, p. 2-5. (Based on address by Wilhelm Jorgensen.)

Application of Mg and its alloys in various articles which are now made from critically unavailable materials. Survey of Mg production and costs. (T general, Mg)

380-T. Knitted Metal Parts Have Unique Industrial Applications. S. G. Kelley, Jr. *Materials & Methods,* v. 34, Aug. 1951, p. 61-63.

Metals knitted into a mesh structure have characteristics that suit them for such diverse uses as filtering, vibration control, removal of entrained gases, and electronic shielding. (T5)

381-T. Magnesium in the Douglas Globemaster II. *Magazine of Magnesium,* Aug. 1951, p. 8-11.

(T24, Mg)

382-T. Magnesium Alloys in the Textile Industry. R. Eastwood and F. Green. *Metal Industry,* v. 79, Aug. 10, 1951, p. 103-105, 113.

Miscellaneous applications. (T29, Mg)

383-T. Zirconium for Manganese in Cupola Iron. Warren C. Jeffery. *Metal Progress,* v. 60, Aug. 1951, p. 65-66.

Comments on "Saving Precious Alloys by Intelligent Use of Alternatives", discussion of James T. MacKenzie (June issue). (Item 285-T, 1951). Believes that, contrary to MacKenzie's opinions, Zr can economically be substituted for Mn in gray cast iron. In addition, a cast iron is produced which is more machinable and has better physical properties. (T general, AY, Al)

384-T. A Suspended Graphite-Spiral Furnace. M. Balicki, E. G. Kendall and W. H. Orthman. *Metal Progress,* v. 60, Aug. 1951, p. 72-74.

Furnace for laboratory use in high-temperature metallurgy up to over 4000° F. It differs from the conventional graphite-spiral type in that it has only one rigid mechanical connection of the heating coil. Numerous advantages. (T5)

385-T. Metallurgical Factors in Drill Collars. *Metal Progress,* v. 60, Aug. 1951, p. 126, 128.

Condensed from "Metallurgical Factors Affecting Drill Collar Performance", R. J. Stoup, *Oil and Gas Journal.* See item 154-T, 1951. (T28, ST)

386-T. Continuous Service With Low Maintenance Cost. G. H. Klouman. *Paper Mill News,* v. 74, Aug. 18, 1951, p. 60-62.

The proper care of stainless steel equipment. Paper-mill equipment that may be replaced by stainless, and types of stainless available. (T29, R general, SS)

387-T. Case Histories of Stainless Roofs. Richard E. Paret. *Sheet Metal Worker,* v. 42, Aug. 1951, p. 35-36, 65.

Histories date back as far as 1924 and show excellent performance. (T26, R3, SS)

388-T. Experience With Austenitic Steels in High-Temperature Service in Petroleum Industry. M. E. Holmberg. *Transactions of the American Society of Mechanical Engineers,* v. 73, Aug. 1951, p. 733-739; disc., p. 739-742.

See abstract of "High Temperature Service With Austenitic Steels." *Petroleum Processing.* See item 128-T, 1951. (T29, Q general, AY, SS, SG-h)

389-T. Refractory Materials Used in the Construction of Reaction Engines. (In French.) Y. Letort. *Métaux: Corrosion—Industries,* v. 26, June 1951, p. 250-255.

Parts of motors subjected to high-temperatures, material requirements, properties of refractories at high temperatures, and kinds of refractories which can be used. Covers refractory metals, oxides, spinels, silicates, porcelains, carbides, sulfides, nitrides, borides, cermets, and glasses. (T25, SG-h)

390-T. Sandwich Metal Stands Up to Heat. George L. Christian. *Aviation Week,* v. 55, Sept. 17, 1951, p. 34, 36.

A material called Rosslyn Metal consists of a copper core sandwiched between outer layers of various types of stainless steel, for use at high temperatures in a variety of applications. Significant economies of Cb, Co, Ni, Cr, and W are achieved by its use. (T general, L24, Cu, SS, SG-h)

391-T. Aluminum Ceiling Panels for Heating and Cooling. E. S. Howarth, S. C. Huddleston, and R. M. Koch. *Heating, Piping & Air Conditioning,* v. 23, Sept. 1951, p. 125-133.

Results of heating and cooling tests conducted on a variety of brazed aluminum ceiling panels for a number of panel and room operating conditions. An analytical solution concerning the thermal performance of metal heating and cooling panels is developed and this is reduced to a design chart for easy application to panels differing markedly from those tested. Comparisons drawn between the actual test results and those predicted by the analytical solution indicate good agreement. (T27, Al)

392-T. Planning and Production Methods Used in the Construction of the DeHavilland Comet. H. Povey. *Journal of the Royal Aeronautical Society,* v. 55, Aug. 1951, p. 459-514; disc., p. 515-517.

Design and production liaison. Methods used in drilling, welding, and casting parts. (T24, E11, G17, K general)

393-T. Ground Flat Steel Now Has Wider Field of Applications. H. J. Chamberland. *Magazine of Tooling and Production,* v. 17, Sept. 1951, p. 70, 72, 74, 76.

Use of ground flat steel as an economical and dependable substitute for tool steels which require substantial machining or are limited in production. Applications. Compositions for forming of thin and thick sections fall in the carbon steel range. (T6, CN)

394-T. Recovery of Heat in Metallurgical Furnaces. (In French.) J. E. Lafon. *Métallurgie et la Construction mécanique,* v. 83, July 1951, p. 539-541.

Technical aspects and gains to be made. (T5)

395-T. Packaging Butter in Aluminum Foil. *Modern Metals,* v. 7, Aug. 1951, p. 23-25.

Based on article by Pierre Prévot, *Revue de l'Aluminium.* See item 201-T, 1951. (T29, Al)

396-T. The Arvida Bridge One Year Later. *Modern Metals,* v. 7, Aug. 1951, p. 35-36.

Made of aluminum, the bridge at Arvida, Quebec, has been in use a full year. It has fully lived up to expectations, has proved that aluminum is suitable for "heavy" construction. Ease of handling in construction, plus lack of need for painting are believed to offset higher first cost of Al over steel. (T26, Al)

397-T. Better Printing with Aluminum Offset Plates. *Modern Metals,* v. 7, Aug. 1951, p. 46.

Use of "3M" sensitized aluminum photo-offset plate, developed by Minnesota Mining & Manufacturing Co. (T9, Al)

398-T. Process Variables in Furnace Operations. Paul Buthod. *Oil and Gas Journal,* v. 50, Aug. 30, 1951, p. 79-81, 92.

A method by which the effect of changes in various process variables on the operation of an existing furnace may be studied. Study was confined to the radiant section of a furnace. (T5)

399-T. An Aluminum Hangar. *Overseas Engineer,* v. 24, July 1951, p. 366-367.

Light-alloy construction which has facilitated the rapid erection of a three-bay hangar at London Airport. (T26, Al)

400-T. Do You Know Pump Metals and Why Each Is Used? J. J. Coffey. *Power,* v. 95, Sept. 1951, p. 112-113.

The materials generally used for the casings, impellers, wearing rings, shaft sleeves, and packing glands in pumps. (T7, CI, Cu, ST)

401-T. Covered Aluminum Railway Wagons. *Railway Gazette,* v. 95, Aug. 24, 1951, p. 214.

Features of design. (T23, Al)

402-T. Production Evaluation of Cutting Tool Materials. Thomas Badger. *Screw Machine Engineering,* v. 12, Sept. 1951, p. 45-54.

Qualities of each of the four basic classes of tool materials—carbon toolsteel, high speed toolsteel, cast alloys, and carbides. Covers red hardness, hardenability, hardness, response to heat treatment, strength, toughness, ease of fabrication, design limitations, and cost. (T6, Q general, TS, C-n, SG-j)

403-T. Tantalum Foil Used in Closing Antro-Oral Fistulas. Earle J. McClung and James E. Chipps. *United States Armed Forces Medical Journal,* v. 2, Aug. 1951, p. 1183-1186.

Ta foil has been successfully used in four cases of the above. (T10, Ta)

404-T. (Book) **Symposium on High Temperature Steels and Alloys for Gas Turbines.** 303 pages. 1951. Iron & Steel Institute, 4 Grosvenor Gardens, London S.W. 1, England.

Includes papers under the headings: user aspects, supplier aspects, performance aspects; sealing and fatigue at elvated temperatures, special casting techniques, welding and machinability aspects, special blade materials, and research and future needs. Individual papers are abstracted separately. (T25, SG-h, AY, SS)

405-T. Progress in Polymetallic Lithographic Plates. Herbert R. Leady. *American Paper Converter,* v. 25, Sept. 1951, p. 10-11, 40-41.

A review of the basic elements in some of the better-known processes in which two or more metals are combined in the same plate. (T9)

406-T. The "Rivaloy" All-Metal Body. *Automobile Engineer,* v. 41, Sept. 1951, p. 337-339.

Describes, diagrams, and illustrates bus bodies produced by a British firm. Steel members and Al-alloy members and sheets are used. (T21, ST, Al)

407-T. Tungsten Carbide Drilling at the Sullivan Mine. J. W. Reynolds. *Canadian Mining and Metallurgical Bulletin,* v. 44, Sept. 1951, p. 630-635.

Methods of testing and comparing performance and costs. (T28, C-n, W)

408-T. New Constructional Material; Silver Now Being Used for Chemical Plant. *Chemical Age,* v. 65, Sept. 8, 1951, p. 331.

Utilization of Ag as lining on a base metal of high strength. A silver-lined mild steel reaction vessel which is corrosion resistant is illustrated. Table gives corrosion resistances of chemically pure Ag to a series of common chemicals at temperatures from room to 350° C. (T29, R general, Ag)

409-T. Hard Facing Alloys for Steel Mill Use. Howard S. Avery. *Iron and Steel Engineer,* v. 28, Sept. 1951, p. 81-106; disc., p. 106.

Types of alloys and some of their properties. Suggests how materials can be selected by using judgment based on an analysis of service factors. Tables, diagrams, graphs, and photomicrographs. 16 ref. (T5, L24, AY, SG-j)

410-T. Packaging in Metallic Foil. W. A. Harrington. *Light Metals,* v. 14, Sept. 1951, p. 503-508.

The latest developments in coated and laminated metallic foils, particularly those with plastic coatings, and actual or potential uses of interest. Reference is also made to printing. (T10, Al, Sn)

411-T. Light Alloy in Road Transport. W. Metcalf. *Light Metals,* v. 14, Sept. 1951, p. 510-517.

Application of wrought and cast aluminium in private cars and vehicles for commercial and public transport purposes. Engineering, structural and decorative uses are considered. Briefly contrasts the exterior use of aluminum on some foreign models, with the tendency of present British practice to rely, wherever possible and permissible, upon chromium. (T21, Al)

412-T. Non-Ferrous Metals and Alloys in Marine Engineering. William McLaughlin. *Metal Industry,* v. 79, Aug. 31, 1951, p. 163-166; Sept. 7, 1951, p. 201-203; Sept. 14, 1951, p. 224-225.

Properties of the various types, their suitability for different marine-engineering applications, especially those involving high pressures and temperatures, and corrosive media. Second part deals with Cu, brasses and bronzes. Last part deals with Al and its alloys, and requirements for bearing materials. (T22, Cu, Al, SG-h, EG-a)

413-T. "Composite Plating"; A New System of Marine Construction in Aluminium-Alloys. *Metal Industry,* v. 79, Aug. 31, 1951, p. 166.

New system of light-alloy construction known as "composite plating" utilizes extrusions for framing. Where traditional construction methods are employed, a vessel made of Al alloy will cost more than one made of steel. The system exploits all the manipulative advantages which Al has over steel, and by so doing simplifies assembly and reduces waste. (T22, Al)

414-T. Marine Propellers. G. T. Callis. *Metal Industry,* v. 79, Aug. 31, 1951, p. 167-170.

Properties and compositions of the various Mn bronzes in current use for marine propellers. Use of Al bronzes. Casting procedures and typical microstructures. Corrosion and erosion resistances. (T22, Q general, R general, Cu)

415-T. Light Metals in Automobiles. F. L. Church. *Modern Metals,* v. 7, Sept. 1951, p. 23-24, 27-28, 31, 33-34, 36.

Reviews the history of light metals in autos, describes some significant developments both here and abroad, and comments briefly on the outlook. (T21, Al)

416-T. Aluminum Aircraft Hangars. *Modern Metals,* v. 7, Sept. 1951, p. 41-42.

Construction by a British firm. (T26, Al)

417-T. Magnesium Bookkeeping Equipment. *Modern Metals,* v. 7, Sept. 1951, p. 44.

Development by LeFebure Corp. Mg was chosen because of its high strength-to-weight ratio. (T10, Mg)

418-T. Die Cast Aluminum Casement Windows. *Modern Metals,* v. 7, Sept. 1951, p. 51-53.

Advantages of the die-casting process over conventional extruded Al and rolled steel construction. (T26, E13, Al)

419-T. Stainless Steel Lining of a Pulp Mill Digester. S. C. Johnson and N. J. Gibson. *Paper Trade Journal,* v. 133, Sept. 14, 1951, p. 20, 22-24, 26-27.

Lengths of strip stainless steel 4 in. wide were welded to the inside surfaces of a pulp-mill digester. Corrosion tests were made before and after the lining process. (T29, R11, L22, SS)

420-T. Aluminum Offers Design Advantages for Refrigeration Equipment. E. W. Mason. *Refrigerating Engineering,* v. 59, Sept. 1951, p. 869-872, 910-912.

Recommended practice notes that may be of interest to designers, operators, and of service when dealing with systems incorporating Al parts. (T27, Al)

421-T. Instrument Springs and Spring Instruments. J. W. Rockeffer, Jr. *Wire and Wire Products,* v. 26, Sept. 1951, p. 764-765, 802-807.

The properties required in springs to make them suitable for precision-instrument applications. Properties and applications of different spring alloys. (T7, Q general, SG-b)

422-T. Reclaiming of Heat in Metallurgical Furnaces. (In French.) *Metallurgie et la Construction Mécanique,* v. 83, Aug. 1951, p. 595-597.

Various set-ups for the above purpose. (T5)

423-T. Modern Trends in Lithography. Paul J. Hartsuch. *Canadian Printer and Publisher,* v. 60, Sept. 1951, p. 38-39, 47.

New materials, equipment, and methods used in the lithographic industry, litho platemaking, dry offset plates, iron-coated plates, paper wraps for damp rollers, and litho ink. (T29)

424-T. Powdered Metals in Electrical Contacts. R. K. Beggs. *Journal of Metals,* v. 3, Oct. 1951, p. 860-863.

Contacts made by powder-metallurgy techniques are generally metallic compounds or mixtures rather than alloys. They may include controlled percentages of oxides, borides, nitrides, etc. They may be combinations of metals which will not alloy or are difficult to alloy in the percentages desired, such as Ag and Ni, or Pt and W. They may be made of metals that will alloy, but where the resulting alloy is so hard and brittle it cannot be worked, such as Pt and Os, or Ag and Ge. Physical properties of materials are tabulated. (T1, H general)

425-T. Materials Engineering Plays Important Role in Development of P & W Jet Engines. *Materials & Methods,* v. 34, Oct. 1951, p. 85-87.

Illustrations and outlines are included for selecting engineering materials and selecting methods to process the materials. (T25)

426-T. Copper-Base Die Castings Now More Widely Used. Ben Johnson and Sidney E. Gregory. *Materials & Methods,* v. 34, Oct. 1951, p. 92-94.

Recognized advantages include close tolerances, elimination of machining, good surface finish, high production rates, and good physical properties. (T general, E13, Cu)

427-T. Titanium in Aircraft. J. B. Johnson and E. J. Hassell. *Metal Progress,* v. 60, Sept. 1951, p. 51-55.

Possibility of wide application. New research developments. Comparative mechanical properties of a series of aircraft structural metals and of three forms of Ti at 70, 300,

and 700° F. are tabulated and charted. (T24, Q general, Ti)

428-T. Caterpillar's Experience with Boron Steels. *Metal Progress,* v. 60, Sept. 1951, p. 66-68.

Specific details of alloys used for given parts, mechanical-property specifications, and total tonnages used of the different alloys. (T21, Q general, AY)

429-T. Gas-Turbine Materials. *Metal Progress,* v. 60, Sept. 1951, p. 124, 126, 128, 129. (Condensed from "Gas-Turbine Performance and Materials," J. B. Bucher.)

Previously abstracted from "Symposium on High-Temperature Steels and Alloys for Gas Turbines," *Iron and Steel Institute,* Feb. 1951. See item 354-T, 1951. (T25, Q3, K9, R9, SG-h)

430-T. Turbine Materials and Performance. *Metal Progress,* v. 60, Sept. 1951, p. 138. (Condensed from "Materials and Performance," A. T. Bowden and W. Hryniszak.)

Previously abstracted from "Symposium on High-Temperature Steels and Alloys for Gas Turbines," *Iron and Steel Institute,* Feb. 1951. See item 353-T, 1951. (T25, Q general, SG-h, AY)

431-T. Use of Aluminum in Petroleum Refinery Equipment. E. E. Kerns and W. E. Baker. *Proceedings, Sixteenth Mid-Year Meeting, Division of Refining, American Petroleum Institute,* v. 31M (III), 1951, p. 89-98; disc., p. 98.

Previously abstracted from *Oil and Gas Journal.* See item 246-T, 1951. (T29, Al)

432-T. Helical Inserts; They Strengthen Threads in Aluminum Castings. *Western Machinery and Steel World,* v. 42, Sept. 1951, p. 81.

Use in solving a problem of stripped threads in automatic stapling machines. The inserts are stainless steel. (T7, SS, Al)

433-T. New Alloy Steel; First Tangible Results of Alloy Research for Steels for the Automotive Industry in Southern California. J. S. C. Wells. *Western Machinery and Steel World,* v. 42, Sept. 1951, p. 87.

New Cr-Mo-V spring steel developed under the direction of Edgar Brooker, for U. S. Spring & Bumper Co. is called Rauenloy. Applications in leaf springs. (T7, AY)

434-T. Five Tons of Magnesium in B-36 Airframe. *Automotive Industries,* v. 105, Oct. 3, 1951, p. 52.

Diagram shows components made of Mg and its alloys. (T24, Mg)

435-T. Aluminum Radiators to Save Copper. *Business Week,* Oct. 13, 1951, p. 52-54, 56.

Production methods. Other industrial applications of Al. (T27, Al)

436-T. Manufacture of a High-Frequency Transmitting Tube. *Electrical Communication,* v. 28, Sept. 1951, p. 171-185.

A picture story of the manufacture of a high-frequency transmitting tube, F-5918 triode. Includes the various machining operations. (T1, G17)

437-T. Powder Metal Gears in Electrical Appliances. *Electrical Manufacturing,* v. 48, Oct. 1951, p. 143-145, 318, 320.

How use of Cu-impregnation process and of Cu-Fe alloys increases the number of applications for powdered metal parts in products such as washers, fans, and food mixers. (T10, H16, Cu, Fe)

438-T. Piping Materials for Chemical Processes. Carl B. McLaughlin. *Heating Piping & Air Conditioning,* v. 23, Oct. 1951, p. 85-94.

Material and other piping requirements for chemical process use. Data are tabulated and charted relative to nominal wall thickness, maximum allowable temperatures and pressures for pipe of various materials. Effects of different fabrication procedures. (T29)

439-T. Designing Aircraft Main Spar Frames. Melvin Stone. *Machine Design,* v. 23, Oct. 1951, p. 111-116.

Selection of materials and fabrication methods. Properties of various Al alloys used. (T24, Al)

440-T. Cast-Weld Design. *Machine Design,* v. 23, Oct. 1951, p. 137-140.

Said to be the key to low-cost steel casting having greater precision and serviceability. Instead of using integral steel castings or structures built up of a number of pieces of rolled steel, in numerous instances manufacturers are producing parts composed of several steel castings, or a combination of steel castings and rolled steel shapes or plate, united by welding. (T26, CI)

441-T. Powder-Metal Gears. D. W. Lynch, T. J. Snodgrass, and T. T. Woodson. *Machine Design,* v. 23, Oct. 1951, p. 146, 184-186, 188, 190. (A condensation.)

Fabrication, properties and applications of gears made for use in General Electric appliances. (T7, H general)

442-T. Designing with Modern Materials. *Machine Design,* v. 23, Oct. 1951, p. 297-350.

A comprehensive survey of the latest developments in engineering

materials. Sections cover ferrous metals, Al and alloys, Mg and alloys, rare-earth alloys, Cu and alloys, Ti and alloys, Mo and alloys, W and alloys, heat and corrosion resistant alloys, cemented carbides, powdered metals, ceramics and refractory materials, plastics, rubbers, finishes, insulations, and lubricants.
(T general)

443-T. Condensed Review of Some Recently Developed Materials Arranged Alphabetically by Trade Names. *Machinery* (American), v. 58, Oct. 1951, p. 159-172.

Includes properties and applications. (T general, Q general)

444-T. The Manufacture of Springs. M. J. Sargeaunt, M. A. Hons. *Machinery Lloyd* (Overseas Ed.) v. 23, Sept. 25, 1951, p. 77, 79, 81, 81-85.

The town of Redditch in England is famous for the manufacture of the smaller types of springs. Some of the methods and equipment used.
(T7)

445-T. Composite Plating; a New Method of Light Alloy Barge Construction. *Metallurgia,* v. 44, Sept. 1951, p. 143-144.

Method introduced by a British firm utilizes the fact that intricate shapes in Al alloys which cannot be rolled may be extruded satisfactorily. The barge is built entirely of such extrusions, except for hatch covers.
(T22, G general, Al)

446-T. How to Tackle Materials Substitution. *Product Engineering,* v. 22, Oct. 1951, p. 123-130.

Considerations in selecting a substitute material; nine suggestions as to how to set up a material program, a table of substitute alloys, carbon, and free-machining steels, and case studies of materials substitutions.
(T general, SG-k, AY, CN)

447-T. Steel Users Must Conserve Alloying Elements. *Product Engineering,* v. 22, Oct. 1951, p. 131-133.

The following suggestions are made to help conserve alloying elements: the use of leaner alloy steels; the replacement of alloy steels with carbon steels through revised heat treatment practice; the use of materials other than steel which are in more abundant supply; new methods of fabrication which require less metal; and the use of boron steels.
(T general, AY, ST)

448-T. Aluminum Output Improves. *Product Engineering,* v. 22, Oct. 1951, p. 138-139.

Recent technical developments and prospective fields of application.
(T general, A4, Al)

449-T. Magnesium Confined to Military Applications. *Product Engineering,* v. 22, Oct. 1951, p. 140-141.

The trend of using Mg alloys rather than pure Mg. Comparative properties of several Mg-Li base alloys as well as a few tension-compression stress-strain curves of alloys under consideration.
(T2, P general, Q general, Mg)

450-T. Copper. *Product Engineering,* v. 22, Oct. 1951, p. 144.

The increasing demand for Cu and the problem of substituting for it.
(T general, Cu)

451-T. Briefs on Other Materials. *Product Engineering,* v. 22, Oct. 1951, p. 145-146.

Pb, Sn, Ni, Mo, Zn, clad metals, and synthetic rubbers. Includes availability of metals, metal alloys, and application.
(T general, A4, EG-a)

452-T. Metal Refractory Alloys. *Product Engineering,* v. 22, Oct. 1951, p. 147-150.

The use of metal-ceramic alloys has widened the field of high-temperature materials. Summation of their properties and some of the limitations. Fabrication of parts is presently limited to powder metallurgical processes.
(T general, H general)

453-T. (Pamphlet) The Role of Nickel in the Machine Tool Industry. William Mounce and J. E. Fifield. 1950, 30 pages. International Nickel Co., 67 Wall St., New York 5, N. Y.

Contains information for use in the selection and specific application of Ni-containing materials by the machine-tool industry.
(T5, Ni, AY, CI)

454-T. (Book) Aircraft Materials and Processes. George F. Titterton. Ed. 4, 1951. 259 pages. Pitman Publishing Corp., 2 West 45th St., New York 19, N. Y.

Metallic and nonmetallic materials and processes used in the construction of aircraft. Testing and inspection procedures, properties and compositions of miscellaneous ferrous and nonferrous metals and alloys, heat treatment, surface hardening, joining, corrosion and its prevention, plastics, wood, fabrics, adhesives, rubbers, glass, etc. Final chapter covers selection of materials for specific applications. (T24)

455-T. New Plate Base and Backing Sheet. *American Pressman,* v. 61, Oct. 1951, p. 33-38.

Two new developments for the printing trade. One is a metal base for mounting plates to type-high that will remain permanently stable

and can be made in any printing plant. The second development is a lead alloy backing sheet which will simplify and speed up the mounting of 16-gage originals to patent base height. (T9, Pb)

456-T. Metals for Tomorrow's Transports. Leo Schapiro. *Aviation Age;* v. 16, Oct. 1951, p. 38-41.

See abstract of "Modern Trends in Airframe Materials," *Metal Progress,* item 215-T, 1951.
(T21, Q general, AY, Ti)

457-T. Tantalytic Capacitors. L. W. Foster. *General Electric Review,* v. 54, Oct. 1951, p. 30-38.

Tantalytic is the General Electric trade name for a foil-type electrolytic capacitor the electrodes of which are made of the metal tantalum. Theory of the electrolytic capacitor, electrical and chemical aspects, construction, and typical characteristics. Production, properties, and applications of Ta. Present and potential applications of the capacitors. (T1, Ta)

458-T. Aluminum Alloys. H. W. Fritts and E. D. Verink, Jr. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2197-2199.

Applications in the chemical, petroleum, and food industries. Use of Al in power plant operations is also discussed. 49 ref. (T29, T25, Al)

459-T. Characteristics of Zinc Plates for Lithographing. A. G. Arend. *Industrial Chemist and Chemical Manufacturer,* v. 27, Oct. 1951, p. 456, 463.

Factors which influence the performance of Zn plates when used for lithographic purposes, and some simple procedures for testing. (T9, Zn)

460-T. Modern Flat Refractory Arches Promote Heating Furnace Economy. N. W. Roudabush, D. E. Jones, and C. E. Grigsby. *Industrial Heating,* v. 18, Oct. 1951, p. 1878, 1880, 1882, 1884, 1886, 1888, 1890.

Advantages from the mechanical viewpoint in forge shops and other locations where vibration tends to break down conventional arches. (T5, B19)

461-T. The Growth of Magnesium. J. D. Hanawalt. *Modern Metals,* v. 7, Oct. 1951, p. 30-31, 33.

Study of long-term growth curves in metals and a review of significant developments since World War II indicate that the Mg industry is now on the eve of assuming its logical position as one of the four major structural metals. (T26, Mg)

462-T. Photographs in Aluminum. Eugene Wainer. *Modern Metals,* v. 7, Oct. 1951, p. 34-36, 38.

The "Aluphoto" process—a recent Swiss invention—by which photographs may be made on an Al base. Anodized Aluphoto plates are said to be highly resistant to heat, abrasion, weather and water, as well as to chemical attack by many acids, solvents, hot oils, and foodstuffs. They also exhibit some superior photographic properties. Important potential uses. (T9, L19, Al)

463-T. Aluminum Splices and Deadends Cut Construction Costs. *Modern Metals,* v. 7, Oct. 1951, p. 43, 45.

Strandlink and Strandvise are the trade names of two new connection devices designed to hold steel-strand messenger, static, and guy wires. Fabricated from Al tubing, they are actually stronger than the stranded-steel wire they are used with. Al was chosen because of its corrosion resistance, its workability before heat treating, and its higher strength afterward. (T7, Al)

464-T. Textiles Turn to Aluminum. *Modern Metals,* v. 7, Oct. 1951, p. 54-56.

Varied uses of Al in the textile industry, indicating advantages over materials previously used. (T29, Al)

465-T. How to Produce Plastic Die Models. J. W. Richards. *SAE Journal,* v. 59, Oct. 1951, p. 32-33.

Proceedings of round-table discussion. New processes and materials aimed at improving casting techniques and making plastic models stronger and less subject to internal stress and accompanying warpage. (T5)

466-T. Research Uncovers Materials for Supersonic Engines, Missiles. A. H. Allen. *Steel,* v. 129, Oct. 22, 1951, p. 78, 80.

Surveys results of recent NACA research. Improved means of cooling turbine buckets and disks, giving a 95% saving in strategic alloy requirements, were developed. Time-lag compensators, electromagnetic flowmeters, hot-gas thermocouples, and electronic computers are other recent products of advanced studies in flight propulsion. (T25, T2)

467-T. Here's a Nut They Couldn't Crack. *Steel Horizons,* v. 13, Fall 1951, p. 10-11.

New type stainless steel locknuts used in jet-airplane and racing-automobile engines for added safety. Tests have shown that they are able to withstand temperatures up to 1600° F. without becoming loose or stricken with seizure.
(T7, K13, SS)

468-T. Powder Metal IF Cores. John P. Tucker. *Television Engineering,* v. 2, Oct. 1951, p. 22-23.

Production and use of finely di-

vided Fe powder core with phenolic resin as a binder and insulator, for use in intermediate frequency (IF) transformers. (T1, H general, Fe)

469-T. Problems and Progress in Manufacturing Bolts, Nuts and Rivets. W. E. Hill. *Wire and Wire Products,* v. 26, Oct. 1951, p. 940, 982-986.

Surveys trends from the practical viewpoint. Drawing lubricants, carbide dies, and problems involved in making steel to be used for bolts, nuts and rivets. (T7, G10, ST)

470-T. Influence of Chemical Composition and Structure of Iron on Ingot Mold Life. (In Polish.) E. Bucko. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 3, 1951, p. 183-200.

Results of tests on 79 square big-end-down molds used for pouring 5-ton ingots. Relation of duruability to chemical composition and microstructure. Results are summarized in English abstract. 19 ref. (T5, D9, Fe)

471-T. Properties and Uses of Aluminum Foil in Packaging. T. M. Hill. *American Paper Converter,* v. 25, Nov. 1951, p. 14, 46, 48.

Mechanical properties, effects of variations in thickness, pinholes and what to do about them, and converted foil products. (T10, Q general, Al)

472-T. New Dyeing Processes Utilize Metals in Finishing Textiles. *Chemical and Engineering News,* v. 29, Nov. 5, 1951, p. 4676-4678.

How molten metal of the fusible alloy type is used in a bath for fixing color. Copper dyeing of acrylonitrile fibers is shown to have wide application. (T29, Cu)

473-T. Manganese Steel in Tin Dredgers. *Edgar Allen News,* v. 30, Oct. 1951, p. 979-980.

Use of Mn steel castings. (T28, AY)

474-T. Aluminum Triplex Cables for Secondaries and Services. I. Sam J. Pearson. *Electric Light and Power,* v. 29, Oct. 1951, p. 112-114.

Application of Al. (T1, Al)

475-T. New Generators Save Copper, Steel. *Iron Age,* v. 168, Nov. 1, 1951, p. 127.

A new generator design by Westinghouse Electric Corp. permits generation of more electric power while using less Cu and steel. (T25, Cu, ST)

476-T. Corrosion-Resistant Metals for the Pulp and Paper Industry. Daniel L. Horigan, *Paper Trade Journal,* v. 133, Oct. 5, 1951, p. 24, 26, 28, 30, 32; Oct. 12, 1951, p. 20, 22, 24, 26.

Part I: The various types of corrosion apt to be encountered. Second part: Properties of the various corrosion resistant metals and forms in which these metals are available. Final part: Specific applications in pulp and paper processing. (T29, R general, SG-g)

477-T. Carbides Cut Costs. J. Van Eaton. *Production Engineering & Management,* v. 28, Nov. 1951, p. 62-64.

The utilization of carbide-insert tools. Performance data. (T6, C-n)

478-T. Tool Steels Developed for Varied Applications. C. B. Post. *Steel,* v. 129, Nov. 12, 1951, p. 84, 89, 98.

Improved manufacturing techniques in the toolsteel industry lead to production of steels of high impact strength, high fatigue resistance, high hardness, resistance to wear and abrasion, and ability to heat treat for desired properties. (T6, TS)

479-T. Aluminum Containers Stretch Tin Supply. G. W. Birdsall. *Steel,* v. 129, Nov. 5, 1951, p. 97-98.

Tin-can protection without "tinplate" is afforded by several different types of packages which use Al alone or Al combined with paper, wax, plastic, or fiber materials. (T10, Al)

480-T. New Type Coaxial Cable Permits Applications in 1,000-10,000 MC Range. Bernard F. Osbahr. *Tele-Tech,* v. 10, Nov. 1951, p. 42-43, 107-108, 110-111.

A German development. The cable features a multi-layer tape insulating-helix of polystyrene and extruded Al sheath. It has ability to transmit radio frequencies up to 10,000 mc. (T1, Al)

481-T. Prefabricated Aluminum Facing Panels. (In French.) Maurice Victor, Jean Blanchot, and Lucien Alff. *Revue de l'Aluminium,* v. 28, July-Aug. 1951, p. 279-283.

Remodeling of the Exhibition Hall of the City of Lille. Construction details, particularly of the facade with its light-alloy panels, balconies, and scaffolding in several colors. (T26, Al)

482-T. Treatment of Burns With Thin Aluminum Foils. (In French.) Pierre Prevot. *Revue de l'Aluminium,* v. 28, July-Aug. 1951, p. 284-287.

Canadian experiments show advantages over grease-base dressings, as wounds do not exude and grafting becomes possible earlier. Al was better than Au, Ag, Sn, or Ta. Therapeutic results. (T10, Al)

483-T. Scientific Principles of Regenerator Design and Practical Conclusions. (In German.) Alfred Schack. *Stahl und Eisen,* v. 71, July 19, 1951, p. 773-776.

Correlations between heating area,

thickness of brick, heat storage capacity, and stability of checkerwork. Design of an ideal high-efficiency blast regenerator. (T5)

484-T. Effect of High-Strength Steels on Weight Reduction and Design in Steel Bridge Construction. (In German.) O. Erdmann. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, July 21, 1951, p. 678-680.

Experiments to determine why the use of high-strength steels failed to produce the expected reduction in the weight of steel bridges. (T26, Q23, CN)

485-T. Aluminum Pontoon Bridges at the Zurich 600th Anniversary Celebration. (In French and German.) *Aluminium Suisse,* Sept. 1951, p. 159-161.

(T26, Al)

486-T. Recent Applications of Aluminum in the Heavy Chemical Industry. (In French and German.) P. Juniere. *Aluminium Suisse,* Sept. 1951, p. 163-172.

(T29, Al)

487-T. Aluminum in Radiant-Heating Systems. (In French and German.) Henri J. Blondel. *Aluminium Suisse,* Sept. 1951, p. 173-180.

Describes, diagrams and illustrates a series of applications. (T27, Al)

488-T. Improved Components and Materials for Reliable Electronic Equipment. A. W. Rogers and B. A. Diebold. *Electrical Manufacturing,* v. 48, Nov. 1951, p. 114-119, 270, 272, 274, 276, 278, 280.

Miscellaneous developments resulting from Signal Corps research sponsorship. The report reviews a number of completed projects in components and materials; gives a "work-in-progress" picture of current and planned projects; and restates the requirements for reliability that arise from the concepts of modern warfare. Covers Ta electrolytic capacitors, as well as various applications of ceramics, plastics, coatings, impregnants, rubbers, etc. 14 ref. (T1, Ta)

489-T. Low-Cost Processing of Alnico Rotors and Stators. J. H. Stark. *Electrical Manufacturing,* v. 48, Nov. 1951, p. 125-127, 248, 250, 252, 254.

Critical supply position of basic Alnico materials underscores economies possible in processing techniques. An analysis of such factors in terms of motor and generator redesign evolution. Casting, machining, powder metallurgy, and other fabrication processes, as well as design principles. (T1, G17, E general, H general, SG-n)

490-T. A New Metal Permits Ideal Gaging Conditions. E. Vanko. *Magazine of Tooling and Production,* v. 17, Nov. 1951, p. 94-95.

New material is a TiC combination known as "Demark", made by Pipe Machinery Corp. for use in thread gaging. (T8, S14, Ti, C-n)

491-T. Aluminium in Structural Engineering. W. C. Devereux. *Metal Industry,* v. 79, Oct. 12, 1951, p. 319-321; Oct. 19, 1951, p. 344-345.

Design, welding, corrosion resistance, and choice of material. (T26, Al)

492-T. Circular Steel Sets Economical at Miami. J. W. Still. *Mining Engineering,* v. 3, Nov. 1951, p. 940-942.

Circular steel sets have proved to be more economical than timber for supporting slusher drifts in the block-caving mining used by the Miami Copper Co., Miami, Ariz. (T28, CN)

493-T. Tight Fittings for Glass Pipe by Die Casting. *Precision Metal Molding,* v. 9, Nov. 1951, p. 35.

Die-cast Al flanges. (T7, E13, Al)

494-T. Chemical Equipment Designed for High Production With Die Casting. *Precision Metal Molding,* v. 9, Nov. 1951, p. 27, 58-59.

Die-cast Al parts are used in "Chlorinet", a device for controlled drinking-water sterilization. (T29, Al)

495-T. (Book) **Aluminum in the Chemical and Food Industries.** Ed. 2, 150 pages. 1951. British Aluminum Co., Ltd., London, England.

Succeeds 1936 edition. Chapter 1: The general properties of Al and its alloys and all the characteristics which render the metal a particularly suitable material for use in the chemical and food industries. Chapter 2: The action of various substances on aluminum and its alloys. Chapter 3: Methods of testing corrosion resistance, preparation of specimens, exposure conditions, etc. Selected bibliography and comprehensive index. (T29, R general, Al)

SECTION V

MATERIALS—

General Coverage of Specific Materials

1-V. German Steels. *Metal Progress,* v. 58, Dec. 1950, p. 906, 908, 910, 912. Condensed from "The Ferrous Metal Industry in Germany During the Period 1939-1945", George Patchin and Ernest Brewin. (BIOS Over-All Report No. 15.)

Original previously abstracted. See item 92-V, 1950. (Fe, ST)

2-V. Cast Al-Cu-Si Alloys. *Metal Progress,* v. 58, Dec. 1950, p. 922, 924. Translated and condensed from "Aluminum Foundry Alloys Based on the Al-Cu-Si Ternary System", Franz Bollenrath and Hanns Grober.

Previously abstracted from *Metallforschung.* See item 4d-51, 1948. (Al)

3-V. Copper-Bearing, High-Strength Wrought Aluminum Alloys; Typical Properties. *Materials & Methods,* v. 32, Dec. 1950, p. 83.

Table covers compositions, physical, mechanical, and fabricating properties, corrosion resistance, available forms, and typical uses for 11S, 14S, 17S, R317, and 24S. (Al)

4-V. Two New Titanium Alloys Announced. *Iron Age,* v. 166, Dec. 28, 1950, p. 74.

Pilot-plant quantities of two new alloys are available from P. R. Mallory, Inc., Indianapolis, in the form of ingots, forged rod, and bar and drop forgings. Both combine good corrosion resistance and useful high strength properties with a high strength-weight ratio. Comparative physical and mechanical properties are tabulated.
(Q general, P general, Ti)

5-V. Titanium—How It Fits in Your Tomorrow. A. H. Allen. *Steel,* v. 128, Jan. 8, 1951, p. 54-58, 79-80, 82.

Present status and future prospects, from economic and technological viewpoints. (Ti)

6-V. Developments in the Antimony Industry; A Review of Published Work, 1945-1950. W. Wendt. *Metal Industry,* v. 77, Dec. 15, 1950, p. 276-278. 38 references. (Sb)

7-V. Uses Broaden For Cast Monel. N. S. Mott. *Iron Age,* v. 167, Jan. 11, 1951, p. 63-67.

Corrosion resistance, physical and mechanical properties, microstructure, weldability, machinability, and applications. Includes table of corrosion resistances vs. a long series of common chemicals and industrial products. (T general, R general, Ni)

8-V. Cobalt. John V. Beall. *Mining Engineering,* v. 190, Jan. 1951, p. 17-24; *Journal of Metals,* v. 191, Jan. 1951, p. 17-24.

Sources, production, and uses of cobalt, not only as a metal or alloying element, but as an ingredient in chemical compounds used in ceramics, glass, paint, and many other industries. Impact of NPA's order for 70% cutback in non-military uses. Includes flowsheet showing method used by Pyrites Co. for recovery of Co from iron pyrites. Economic data are tabulated.
(T general, B14, A4, Co)

9-V. Arc-Cast Molybdenum Probed for High-Temperature Utility. J. L. Ham. *Steel,* v. 128, Jan. 15, 1951, p. 106-108.

Properties and applications of commercial product, which is now cast in 9-in. ingots weighing 1000 lb. It is malleable above 2200° F., and reacts conventionally to annealing. Alloys complicate fabrication problems of the cast ingots. (Mo)

10-V. Less Familiar Metals of Commercial Importance. Otto Kay and Robert A. Lubker. *Product Engineering,* v. 22, Jan. 1951, p. 106-109.

Properties and applications of Be, Zr, V, Ta, Mo, W, and Ti. Brief tab-

ular information on Li, Na, Ca, B, Ga, In, Tl, Ge, Cb, Se, Te, and Rh. (EG-b, d, e. f)

11-V. Titanium: A New Workhorse? Clyde Williams. *Monthly Business Review,* v. 33, Dec. 1950, p. 5.

Economics of titanium production, its properties, and prospects for greatly increased utilization. (Ti)

12-V. Stainless Is Growing Apace. Richard E. Paret. *Metal Progress,* v, 59, Jan. 1951, p. 58-61.

Present economic and technical status, applications, and future prospects. (T general, A4, SS)

13-V. Nodular Iron—A Bibliography. F. R. Morral. *American Foundryman,* v. 19, Jan. 1951, p. 43-44.

Recent literature on nodular cast iron as additional material to the bibliography published in the July, 1950 issue. (See item 156-V, 1950.) 109 ref. (CI)

14-V. Nickel-Tin Bronzes. James S. Vanick. *Foundry,* v. 79, Feb. 1951, p. 102-107.

Heat treatment, mechanical properties, and applications of the Cu-base alloys known as the "Ni-Vee" bronzes. These bronzes contain about 5% Ni and 5% Sn, although the percentages may be varied for specific purposes, and Pb and Zn may be added to certain analyses. (Q general, J general, T general, Cu)

15-V. Ga: A Byproduct Metal. A. P. Thompson and H. R. Harner. *Journal of Metals,* v. 191, Feb. 1951, p. 91-94.

History of discovery of the element gallium; its distribution in the earth's crust; minerals with which it is associated; recovery methods; chemical, physical, and mechanical properties; and possible uses. 15 ref. (Ga)

16-V. The Industrial Status of Ductile Iron. A. P. Gagnebin. *Mechanical Engineering,* v. 73, Feb. 1951, p. 101-108.

Reports on progress made thus far, properties being obtained, castings being made, and some of the special features that have been developed which bear on potential for future growth. 10 ref. (CI)

17-V. The Alchemist and the Alloy. *Steelways,* v. 7, Jan. 1951, p. 30-32.

Role of phosphorus in high-strength structural steel. Mining and preparation of phosphorus. Applications of the steels. (T general, AY)

18-V. Heat-Resisting Steels. J. F. Sewell. *Murex Review Limited,* v. 1 no. 7, 1950, p. 144-160.

Compositions, microstructures, properties, and applications. (SG-h, ST)

19-V. Recent Progress in the Production and Fabrication of Stainless Steels With Particular Reference to Sheet and Strip. *Metallurgia,* v. 42, Dec. 1950, p. 367-371.

An illustrated survey. Includes plant-layout diagrams and a table showing compositions, physical, mechanical, and fabrication properties of nine stainless steels. (SS)

20-V. Copper and Copper Alloys; Technical Progress in 1950, E. Voce. *Metallurgia,* v. 42, Dec. 1950, p. 382-391.

135 references. (Cu)

21-V. Die-Block Steels for Drop Forging; Composition and Treatment. H. J. Merchant. *Metal Treatment and Drop Forging,* v. 18, Jan. 1951, p. 13-21, 24.

Requirements and selection of steels for die blocks. Method of fabrication, heat treatment, hardness, and testing of die-block steels. Brief reference is made to future trends. (T5, F22, TS, SG-j)

22-V. Palladium Alloys. A. D. Merriman. *Metal Treatment and Drop Forging,* v. 18, Jan. 1951, p. 23-24.

Properties, methods of fabrication, and applications. (Pd)

23-V. A New Medium-Strength Wrought Light Alloy of the Aluminium-Zinc-Magnesium Family — T.35. J. F. G. Herenguel. *Metal Treatment and Drop Forging,* v. 18, Jan. 1951, p. 33-36.

Previously abstracted under similar title from French version in *Revue de l'Aluminium.* See item 146-V, 1950. (Al)

24-V. High Grade Special Bronzes. (In German.) E. Weisner. *Metall,* v. 5, Jan. 1951, p. 5-8.

Compositions; mechanical, chemical, thermal, and electrical properties; and specific uses of binary and polynary alloys of Cu with Al, Ni, Mn, Ag, Si, Be, and Pb, with or without other elements as secondary ingredients or impurities. (Q general, P general, T general, Cu)

25-V. Manufacture and Properties of Resistance Wires Containing 82.5% Cu, 12.0% Mn, 4.0% Al, and 1.2% Fe. A. Krupkowski and I. Z. Misiolek. (In Polish) *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 4, 1950, p. 273-284.

Literature on resistance wires used for electrical heating and measurements is reviewed. An alloy called "novo-Constantan" was chosen for investigation. Conditions of melting and casting. Chemical composition, microstructure, Brinell hardness, specific gravity, and melting point of the cast alloy. Annealing procedures. (Cu, SG-q)

26-V. Bearing Alloys. (In Polish.) S. Balicki. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 4, 1950, p. 327-338.

Bearing alloys subdivided into 10 groups—their most important characteristics. Manufacture by static casting, by centrifugal casting, and by application of a continuous steel strip. Percentage use of various bearing alloys in bearing production, their relative production costs, typical installations of the most heavily loaded bearings, and average bearing life. Replacement of Sn-bearing alloys with alloys containing only 6-16% Sn. Electroplating upon the bearing surface of a thin layer of Pb-Sn alloy often followed by indium diffusion treatment. 24 ref. (T7, SG-c)

27-V. Trends in Aluminum Casting Alloys. Walter Bonsack. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 69-75.

Development of common casting alloys in the U. S. Structure and mechanical properties. (E general, Q general, M27, Al)

28-V. Characteristics of Some Aluminum-Zinc-Magnesium-Copper Casting Alloys. W. E. Sicha and H. Y. Hunsicker. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 333-341; disc., p. 341-345.

Previously abstracted from preprint. See item 112-V, 1950. (E11, E12, Q general, Al)

29-V. Development of High-Strength Magnesium Casting Alloy ZK61. J. W. Meier and M. W. Martinson. *Transactions of the American Foundrymen's Society,* v. 58, 1950, p. 742-750; disc., p. 750-751.

Previously abstracted from preprint. See item 113-V, 1950. (J general, Q general, Mg)

30-V. (Pamphlet) **Magnesium Alloys and Products.** 1950, 74 pages. Dow Chemical Co., Midland, Mich.

Forms in which Mg alloys are manufactured. Physical and mechanical properties. Includes tabular data. (Mg)

31-V. A Review of the Properties and Uses of Super-Purity Aluminium. S. M. Lawrence. *Sheet Metal Industries,* v. 28, Feb. 1951, p. 141-145.

(P general, Q general, T general, Al)

32-V. Discaloy. E. F. Losco. *Westinghouse Engineer,* v. 11, Mar. 1951, p. 50-53.

See abstract of "Iron-Base Heat Treatable Alloy Has Good High-Temperature Strength," *Materials & Methods,* item 207-V, 1950. (SG-h)

33-V. Titanium Rapidly Growing as Useful Engineering Material. W. T. Tiffin and P. C. Hoffman. *Materials & Methods,* v. 33, Feb. 1951, p. 57-59.

Reviews progress to date; present and future applications. (Ti)

34-V. Good Steel Casting Design Improves Quality and Reduces Costs. Charles W. Briggs. *Materials & Methods,* v. 33, Feb. 1951, p. 68-71. (Adapted from "Fundamentals of Steel Casting Design", Steel Founders' Society of America; and Chapter IV, "Steel Castings Handbook".)

Inherent characteristics of steel castings; preventing hot spots; strength considerations; section thickness; dimensional tolerances. (CI)

35-V. Developments in High-Temperature Metals and Ceramics. Hans Thurnauer. *Electrical Manufacturing,* v. 47, Mar. 1951, p. 82-85, 230, 232.

Properties and applications of various compositions. (SG-h)

36-V. Iron and Steel. G. E. Speight and D. J. D. Unwin. *Reports on the Progress of Applied Chemistry,* v. 34, 1949, p. 94-120.

A general review. 115 ref. (Fe, ST)

37-V. Non-Ferrous Metals; Physical Metallurgy. D. W. Wakeman. *Reports on the Progress of Applied Chemistry,* v. 34, 1949, p. 121-138.

Physical and mechanical properties, melting, coating, corrosion, and protection. 193 ref. (P general, EG-a)

38-V. Pure Hafnium Arrives. *Chemical Industries Week,* v. 68, Mar. 3, 1951, p. 19.

First commercial production of pure Hf metal by Foote Mineral Co. Present and potential applications. (Hf)

39-V. Flat Rolled Stainless Steel. John L. Cotsworth. *Canadian Metals,* v. 14, Feb. 1951, p. 10-13, 45-46.

Elementary explanations of metallurgy, standards, melting, hot rolling, annealing, and pickling, cold rolling, and polishing. Recommended user specifications. (S22, SS)

40-V. Notes on Magnesium Alloys. F. A. Fox. *Engineer,* v. 191, Feb. 2, 1951, p. 148-150; Feb. 9, 1951, p. 180-182.

First installment: production, foundry practice, and mechanical properties. Extrusions and forgings and their mechanical properties. Part II: heat treatment, fatigue properties, surface protection, and applications. (Mg)

41-V. Manganese Steels. (In French.) Etienne Sautereau. *Fonderie,* Dec. 1950, p. 2299-2301.

Method of production, chemical composition, mechanical properties,

and optimum heat treatment of Mn steel containing 12-14% Mn, 1-1.4% C, 0.4-1.0% Si, less than 0.06% S, and less than 0.1% P. To increase fatigue strength, addition of 1-2% Cr or about 0.9% Mo is proposed. (Q7, AY)

42-V. Highly Refractory Metals, Alloys, and Metallic Compounds. (In French.) M. Oswald. "Les hautes Températures et leurs Utilisations en Chimie, Vol. II" (Masson et Cie., Paris), 1950, p. 1218-1258.

A comprehensive review indicating composition, chemical and physical properties, and fields of application. 122 ref. (EG-d, SG-h)

43-V. Aluminium and Its Alloys in 1950. E. Elliott. *Metallurgia,* v. 43, Feb. 1951, p. 69-72.

Some aspects of research and technical progress. 42 ref. (Al)

44-V. Steels for Plastic Molds. *Metal Progress,* v. 59, Mar. 1951, p. 402, 404-405, Condensed from "The Plastic Mold Steels—Their Selection and Treatment," Lester F. Spencer.

Previously abstracted from *Tool Engineer.* See item 223-V, 1950. (TS)

45-V. Pure Iron. *Metal Progress,* v. 59, Mar. 1951, p. 405-406. Extracted from reports of National Physical Laboratory, England, 1948 and 1949.

Development of equipment and procedures for production of 25-lb. ingots of 99.96% iron and its alloys. Studies of mechanical properties and transformations. (Fe)

46-V. German Light Metal Industry. J. B. English. *Metal Progress,* v. 59, Mar. 1951, p. 426, 428, 430. Condensed from "The Non-Ferrous Metal Industry in Germany During the Period 1939-1945; Light Metal Portion", BIOS Report No. 23.

Original previously abstracted. See item 77-V, 1950. (Al, Mg)

47-V. Russians Have New Heat-Resistant Alloys. S. L. Case. *Iron Age,* v. 167, Mar. 22, 1951, p. 65-69.

Summary and evaluation of recent Russian literature in the field of Fe-Cr-Al alloys which, because of shortages of Ni and Co in the U.S.S.R. during World War II were introduced as a substitute for use in electrical resistors and other high-temperature uses. The electrical resistance of such ternary alloys increases with increased Cr and Al contents; Al exerts a stronger influence than Cr. (P16, Fe, Cr, Al, SG-h,q)

48-V. Nickel-Chromium-Molybdenum Steels. *Materials & Methods,* v. 33, Mar. 1951, p. 105.

Data sheet covers compositions, physical and mechanical properties, fabricating properties, corrosion resistance, available forms, and uses. (AY)

49-V. Metallurgy Bucks a Heat Wave. John Edwards. *Steelways,* v. 7, Mar. 1951, p. 20-23.

Development of high-temperature steels and alloys for use in gas turbines, rockets, ramjet engines, etc. (T25, SG-h, ST)

50-V. More Notes on Beryllium. H. Manley. *Atomics* (London), v. 2, Mar. 1951, p. 84-87.

Be ores and their grading, Be metal and its properties, Be-Al alloys, and toxicity. (Be)

51-V. Magnesium. A. Short. *Machinery Lloyd* (Overseas Edition), v. 23, Mar. 17, 1951, p. 68-71, 73, 75.

Methods of production, properties, and applications. (Mg)

52-V. Ten Years of Progress in the Aluminum Industry (In French and German.) *Aluminium Suisse,* Jan. 1951, p. 5-12.

Modern methods of producing and processing (casting, extending, welding, enameling), Al and its alloys; also their uses in the home and in industry. (Al)

53-V. Choice of Alloys for Aluminum Casting. (In German.) A. Buckeley. *Giesserei,* v. 38, (new ser., v. 4), Mar. 8, 1951, p. 111-112.

Properties and uses of different Al alloys. A table lists compositions, casting properties, and uses of ten different alloys. (Al)

54-V. Nickel-Aluminum Alloy Combines Strength and Corrosion Resistance. Philip O'Keefe. *Materials & Methods,* v. 33, Apr. 1951, p. 73-77.

Properties of new alloy called "Duranickel" which contains 93.7% Ni, 4.4% Al, and smaller amounts of Cu, Mn, Fe, Si, C, and S. Advantages for uses where high hardness and great strength at room and high temperatures are required in addition to excellent corrosion resistance. Fabrication properties and heat treatment. (Ni, SG-g, h)

55-V. (Book) **ABC of Iron and Steel.** Ed. 6. Dan Reebel, editor. 440 pages. 1951. Penton Publishing Co., 1213 W. Third St., Cleveland 13. $10.00.

Twenty-seven chapters, each written by an expert on a particular subject. Subjects are: Iron ore mining, beneficiation, and reserves; iron ore transportation and handling; metallurgical coke and resultant coal chemicals; scrap iron and steel; pig iron; openhearth steel; bessemer steel; electric arc furnace steel; wrought iron; art of roll pass design; semifinished steel; structural shapes and rails; merchant shapes; bars; plates; butt and lap-welded pipe, conduit, and electric metallic

tubing; seamless steel pipe and tubes; wire and wire rods; hot and cold rolled strip and sheets; tin plate; stainless steel; toolsteel; forgings; gray iron castings; malleable iron castings; steel castings; and high-alloy steel castings. The material was originally published in *Steel* and has been abstracted separately. (Fe, ST)

56-V. (Book) **The A-B-C's of Aluminum.** G. W. Birdsall. 96 pages. 1950. Reynolds Metals Co., 2500 S. 3rd St., Louisville 1, Ky. Free.

Divided into 3 principal sections: alloys; benefits; and uses. A special feature is a series of 69 pictures and charts arranged in sequence to show how Al is produced from raw ore; made into metallic Al; and then processed to form sheet, rod, bar, and other mill products. Pictures of typical fabricating operations such as welding and forming. (Al)

57-V. (Book) **The Aluminum Data Book.** 194 pages. 1951. Reynolds Metals Co., 2500 S. 3rd. St., Louisville, Ky. Free.

Pocket-size manual contains 117 tables of data on physical, chemical, and mechanical properties; standard tolerances; weights; standard sizes and production limits; as well as much fabricating data. Includes tables showing relative corrosion resistance, action of many chemicals, elevated and low-temperature properties, fatigue strengths, minimum-bend radii, joining methods, finishes for aluminum. Illustrations show various operations in the production of aluminum. (Al)

58-V. (Book) **Bearings; Engineering and Purchasing Data.** 173 pages. Cleveland Graphite Bronze Co., 17000 St. Clair Ave., Cleveland.

Standard size lists, manufacturing and research, technical data, and submission data sheets. Casting, machining, and plating processes; performance characteristics; analyses; applications; and product design. (SG-c)

59-V. (Pamphlet) **The Engineering Properties of Cast Iron.** R. G. McElwee, chairman. American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5. 1950, 93 pages.

Committee report describes the general chemical and physical nature of cast iron emphasizing outstanding physical and mechanical properties. Various grades of cast iron are compared with other ferrous-base metals. A guide to the design engineer. Tabulates specific applications, giving a typical analysis and properties for each. Theories relating to properties and preferred practices. (Q general, P general, CI)

60-V. (Book) **Alcoa Aluminum and Its Alloys.** 178 pages. 1950. Aluminum Co. of America, Pittsburgh.

Chemical, physical, and mechanical properties; heat treatment; corrosion resistance; wrought products; choice of alloy and general design characteristics for castings; and fabricating practices. (Al)

61-V. (Pamphlet) **The Use of Aluminium Alloys in Structural Engineering.** Nov. 1950, 44 pages. Aluminium Development Association, 33 Grosvenor St., London W. 1, England.

Examples of aluminum structures in service. Structural alloys, their mechanical properties, design, durability, and fabrication methods. (T26, Al)

62-V. (Book) **Aluminium—Taschenbuch** (Aluminum Handbook). Ed. 10. Over 600 pages. Aluminium-Zentrale E.V., 31 Alleestrasse, Düsseldorf, Germany. 12.60 DM.

Covers every phase of the subject in 15 major sections, 70 sub-sections, and a few hundred sub-sub-sections. Various employers' organizations and standard specifications both for the pure metal and its alloys. Publications and books on the subject are detailed in an appendix and elsewhere. (Al)

63-V. Versatile Aids to Industry. *Inco Magazine,* v. 24, Spring 1951, p. 8-10, 32-33.

Properties of the Pt metals and alloys. How they increase plant capacity, control quality, and prolong equipment life. Applications. (T general, Pt, EG-c)

64-V. Cobalt. J. Lomas. *Mine & Quarry Engineering,* v. 17, Apr. 1951, p. 128-130.

The various Co minerals and deposits, metallic and nonmetallic uses. (T general, B10, Co)

65-V. Manipulation of Corrosion and Heat-Resisting Steels. Part II. J. A. McWilliam. *Welding & Metal Fabrication,* v. 19, Apr. 1951, p. 133-139.

Hot forging and drop stamping; heat treatment; hot dishing and flanging; use of jigs for welding 18-8 steels; finishing operations; and grinding and polishing. (SG-c, h)

66-V. Characteristics, Limitations, and Applications of Malleable Iron Castings. Harry A. Schwartz. *Foundry,* v. 79, May 1951, p. 102-103, 236-239.

From the point of view of the malleable founder and of his customers. (CI)

67-V. A Review of Beryllium and Beryllium Alloys. John T. Richards. *Journal of Metals,* v. 3, Mar. 1951, p. 379-386.

Extraction and production processing, physical and mechanical

properties, structure and transformations, applications, etc. 91 ref. (Be)

68-V. Fabrication of Titanium. *Light Metal Age,* v. 9, Apr. 1951, p. 14-15.

Weldability; forgeability; rolling quality; formability; heat treatment; descaling; melting and casting; machinability; swaging; handling; and commercial quality. (Ti)

69-V. Lithium: Lightest Light Metal—Progress and Review. Samuel Hoffman. *Light Metal Age,* v. 9, Apr. 1951, p. 19-20.

(Li)

70-V. Some Notes on the Aluminium Bronzes. David D. Stead. *Australasian Engineer,* v. 44, Mar. 7, 1951, p. 44-51.

History, structure, types of alloys and effect of additions, physical properties, heat treatment and its influence on structure and properties, corrosion resistance, casting—recommendations and troubles, cold working, joining, machinability, applications, and future possibilities. 22 ref. (Cu)

71-V. Ductile Cast Iron. P. Markwell. *Australasian Engineer,* v. 44, Mar. 7, 1951, p. 61-65.

An illustrated review. (CI)

72-V. Minor Uses of the Light Metals. V. Titanium in Alloy Steel. *Light Metals,* v. 14, May 1951, p. 268-270.

(Ti, AY)

73-V. Commerical Uses of Zirconium Developing. G. L. Miller. *Iron Age,* v. 167, May 17, 1951, p. 83-87.

Because American Zr production all goes to AEC, the English have been the first to supply the metal to industry. Modified Kroll process for sponge production used by Murex, Ltd., Rainham, England. Properties, fabrication and applications. (Zr)

74-V. Advances in Metals. *Product Engineering,* v. 22, May 1951, p. 158-161.

New developments in alloy steels, Al, Mg-base alloys, Ti, and less common metals. Applications and properties are emphasized. (AY, Al, Mg, Ti, EG-b)

75-V. Austenitic Stainless Steels, *Materials & Methods,* v. 33, May 1951, p. 99, 101.

Data sheet gives compositions, physical and mechanical properties, thermal treatments, fabrication properties, corrosion resistance, available forms, and uses of seven types of austenitic stainless. (SS)

76-V. 3 Job-Hungry Metals Now Report for Duty. *Modern Industry,* v. 21, May 15, 1951, p. 48-51.

In, Te, and Tl are said to offer unique alloying abilities and unusual physical properties. Since supplies are said to be ample, properties and present and potential applications are surveyed. (In, Te, Tl)

77-V. Magnesium Output and Uses Multiplying; Doan Foresees Big Demand. Leland I. Doan. *Modern Metals,* v. 7, May 1951, p. 22-26.

President of Dow Chemical Co. outlines his company's views on the past, present, and future development of the industry. (T general, Mg)

78-V. Hastelloy Alloys. (In German.) E. Franke. *Werkstoffe und Korrosion,* v. 2, Apr. 1951, p. 140-149.

Compositions, properties, and uses of four different Hastelloys, with special emphasis on their chemical resistance to corrosion. 23 ref. (R general, Ni)

79-V. Nickel-Alloyed Manganese Bronze. James V. Vanick. *Foundry,* v. 79, June 1951, p. 122-125, 226, 228.

Sixth of a series describing properties, applications, and production of these bronzes. Characteristics and foundry practices applicable to Mn bronze. (Cu)

80-V. High-Temperature Steels and Alloys for Gas Turbines. Tom Bishop. *Metal Progress,* v. 59, May 1951, p. 653-656, 690, 692, 694, 696.

Comprehensive report on Iron and Steel Institute Symposium on High-Temperature Steel and Alloys for Gas Turbines, held in London, Feb. 21-22, 1951 (T25, SG-g, h)

81-V. Zirconium. G. L. Miller. *Murex Limited Review,* v. 1, no. 8, 1951, p. 184-194.

Production, fabrication, properties, and applications. 23 ref. (Zr)

82-V. How to Work Titanium and Its Alloys. Anderson Ashburn. *American Machinist,* v. 95, June 11, 1951, p. 145-153.

Includes a series of articles on Ti, which summarize the information now available. Properties, heat treatment, machining, forging, bending, welding, and descaling and cleaning are discussed. (Ti)

83-V. Non-Magnetic Alloys. *Edgar Allen News,* v. 29, May 1951, p. 853-856.

Physical properties and numerous industrial applications, mainly using non-magnetic Mn steel. (To be continued.) (AY)

84-V. Properties of Tin Alloys. W. H. Dennis. *Mine & Quarry Engineering,* v. 17, June 1951, p. 193-196.

Effect of other elements upon Sn, Babbitt metal, solder, fusible alloys, and miscellaneous alloys. (Sn, SG-c)

85-V. Zirconium; Production, Properties and Alloys. G. L. Miller. *Metallurgia,* v. 43, May 1951, p. 209-214, 220. (Zr)

86-V. Notes on Some Recent Progress in the Aluminum and Aluminum-Alloy Industry. (In French.) R. Rohmer. *Revue Générale des Sciences pures et Appliquées et Bulletin de la Société Philomathique,* v. 57, Nos. 11-12, 1950, p. 278-287.

Reviews literature, including methods of preparation, influence of degree of purity on its properties, protection of the Al surface, various Al alloys, and future possibilities. 77 ref. (Al)

87-V. (Pamphlet) **The Making of Steel.** 1950. 96 pages. American Iron and Steel Institute, 350 Fifth Ave., New York.

Complete details, including all phases of manufacture from mining and shipping to the development of new steels. Primarily it is a textbook for laymen. Complete index. (D general, F general, ST)

88-V. Magnesium, Lightest of the Light Alloys. C. J. P. Ball. *Light Metals,* v. 14, June 1951, p. 329-334.

Production, properties, and applications. (Mg)

89-V. Wrought Aluminum Alloys. Philip O'Keefe. *Materials & Methods,* v. 33, June 1951, p. 89-104.

Special section covers nomenclature and alloy composition, available forms, physical and mechanical properties, corrosion and chemical resistance, working wrought alloys, joining; and finishes for Al. (Al)

90-V. The Story of Nickel and Cobalt. Charles A. Scarlott. *Westinghouse Engineer,* v. 11, July 1951, p. 117-123.

Location and extent of deposits, methods of recovery and refining, properties, fabrication, and applications. (Ni, Co)

91-V. Developments in Magnesium Alloys. H. G. Warrington. "Progress in Metal Physics" (Interscience Publishers, New York), p. 121-148.

Reviews and correlates work since 1942. Includes structures and transformation, physical and mechanical properties, and corrosion resistance. 53 ref. (Mg)

92-V. A Versatile Aluminum-Copper-Silicon Alloy. A. P. Fenn. *Metal Treatment and Drop Forging,* v. 18, June 1951, p. 246-248. (A condensation.)

Mechanical properties of the Al-Cu-Si alloy known as DTD 424. Effect of heat treatment on sand cast and gravity die cast pieces; effect of aging; corrosion resistance; and applications. (Al)

93-V. Nickel-Free Stainless Steels; A Review of Compositions, Properties, and Uses. C. B. Tupholme. *Sheet Metal Industries,* v. 28, June 1951, p. 541-545.

Compositions and mechanical properties. (SS)

94-V. Zirconium. (In German.) W. v. Haken. *Chemie-Ingenieur-Technik,* v. 23, May 1951, p. 251-253.

Properties, production, and uses of Zr and its alloys; also the Zr-bearing minerals and their occurrence, and status of large-scale production in the various countries. (Zr)

95-V. Advances in Copper and Its Alloys. John R. Freeman, Jr. *Canadian Metals,* v. 14, June 1951, p. 10-12, 48.

New developments in production and use. (Cu)

96-V. Zirconium. G. L. Miller. *Machinery Lloyd* (Overseas Ed.), v. 23, June 9, 1951, p. 68-69, 71, 73.

Production, properties, and applications. (Zr)

97-V. (Book) **Engineering Materials Manual.** T. C. DuMond, editor. 386 pages. 1951. Reinhold Publishing Corp., 330 West 42nd St., New York 18. $4.50.

A collection of material published as "manuals" in *Materials & Methods* during the last few years. 28 sections, each presenting the complete story of a single material or group of materials. Sections on irons, steels, stainless steels, Al, Mg, Cu alloys, several types of finishes and coatings. Fundamentals of each subject are explained for people without previous experience in the field. (CN, SS, AY, TS, CI, Al, Mg, Ni, Cu, C-n, SG-c, SG-m)

98-V. Characteristics and Technology of Some Aluminum-Base Bearing Alloys. (In Italian.) *Alluminio,* v. 20, 1951, p. 173-185.

Presents comprehensive summary of available information on compositions, microstructures, physical and mechanical properties of the above alloys. Tables, graphs, and photomicrographs. 19 ref. (Al, SG-c)

99-V. How to Ensure Effective Use of Materials. J. R. Widdowson. *Machinery* (London), v. 79, July 12, 1951, p. 79-81.

An abstract of a paper presented at the Harrogate conference of the Institution of Product Engineers. Alternative steels to replace the scarce, more highly alloyed types. Considers conservation of H_2SO_4 and fuel. (AY, ST)

100-V. Ductile Iron Saves Strategic Materials for Defense Program. *Inco,* v. 24, no. 4, p. 12-13.

Brief survey of the applications of ductile iron and its advantages over steel forgings. (CI)

101-V. Molybdenum: A New High-Temperature Metal. Robert M. Parke. *Metal Progress,* v. 60, July 1951, p. 81-96.

A new role for Mo—its use as a structural material resistant to the damaging effects of temperature. Various physical and mechanical properties related to its new uses. 81 ref. (Mo)

102-V. Zirconium. Stephen M. Shelton. *Scientific American,* v. 184, June 1951, p. 19-21.

A general review of developments in use and technology. (Zr)

103-V. What Do You Know About Stainless? Howard E. Boyer. *Steel Processing,* v. 37, June 1951, p. 287-292; July 1951, p. 345-349.

The various types of stainless steel, their compositions, properties, and microstructures. (SS)

104-V. Metals for the West. R. G. Paul. *Western Machinery and Steel World,* v. 42, July 1951, p. 93-95.

Operations in Al manufacture at the Vernon Works, Los Angeles. Includes ingot production, foundry melting and alloying, extrusion, heat treatment, forging, etc. (Al)

105-V. Processing Titanium. Frank Charity. *Modern Machine Shop,* v. 24, Aug. 1951, p. 168-170, 172, 174, 176, 178.

Experimental work at North American Aviation on primary and secondary working, heat treatment, and joining of Ti. Results point way to wider application. (Ti)

106-V. Nickel. John V. Beall. *Mining Engineering,* v. 3, Aug. 1951, p. 664-673.

Economic aspects of this strategic metal. Statistics on consumption, properties, and uses of alloyed and unalloyed nickel commodities. Reserves and production methods. (Ni)

107-V. Properties and Uses of Aluminium and Its Alloys. W. H. Dennis. *Mine & Quarry Engineering,* v. 17, Aug. 1951, p. 261-264.

Review and production statistics. (Al)

108-V. Probing Into the Unusual Metals. Clyde Williams. *Monthly Business Review,* v. 33, Aug. 1951, p. 12.

Reviews the research and production situation for unusual metals such as Zr, Ge, Mo, U, Ti, and V. Properties affecting applications of these metals.
(EG-b, Zr, Ge, Mo, U, Ti, V)

109-V. Boron Steels: A New Era in Alloy Metallurgy. D. I. Brown. *Iron Age,* v. 168, July 5, 1951, p. 79-85; July 12, 1951, p. 85-90; July 19, 1951, p. 102-106; July 26, 1951, p. 68-72; Aug. 9, 1951, p. 75-79; disc., p. 79-80.

The background of boron steels; recommended alternates for standard grades; and advantages and limitations of the new steels. Compositions and effects on hardenability and isothermal-transformation temperatures. Part III: results of fatigue, tensile, and wear tests. Part IV: tests on parts made from the new steels. Part V: some boron steels which have been adopted for cold-headed bolt applications to replace the 4037 grade. Types used for shafts. (AY)

110-V. Magnesium-Cerium Wrought Alloys for Elevated-Temperature Service. K. Grube, J. A. Davis, and L. W. Eastwood. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 965-987; disc., p. 988.

Previously abstracted from *American Society for Testing Materials.* Preprint 30, 1950. See item 143-V, 1950. (Mg, SG-h)

111-V. Aluminum—6 Per Cent Magnesium Alloys for Elevated-Temperature Service. L. W. Eastwood, Webster Hodge, and C. H. Lorig. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1013-1033; disc., p. 1034.

Composition, physical and mechanical properties, corrosion resistance, and machinability of an alloy of above type developed as a result of a systematic study Al-base alloys containing Mg. (Al)

112-V. Chromium-Base Alloys. W. L. Hevekotte, C. T. Greenridge, and H. C. Cross. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1101-1126; disc., p. 1127-1130.

A condensed version of the final report which summarized results of research conducted at Battelle Institute from Oct. 1945, to Mar. 1950, on Cr-base alloys, particularly the 60-15-25 Cr-Fe-Mo type, for Office of Naval Research. Main topics are the melting and casting apparatus; preparation of test materials; microstructures; mechanical properties; and high-temperature oxidation resistance. Mechanism of microcrack formation and role of plastic deformation. (Cr)

113-V. Stainless Steel. B. H. DeLong. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 340-357.

Survey giving historical, operational, and production data. Properties of stainless steels. (SS)

114-V. Bibliography on Titanium Metal and Alloys (1946-1950) (Properties, Fabrication, Uses). J. W. Meier. *Canada Dept. of Mines and Technical Surveys,* Information Memorandum 303, Dec. 20, 1950. 17 pages.

211 references. (Ti)

115-V. Production and Properties of Aluminium Casting Alloys. F. H.

Smith. *Institute of British Foundrymen*, Paper 1006, 1951, 19 pages.

Equipment and procedures, with emphasis on recovery of secondary Al. Compositions, trade names, miscellaneous properties, and production and consumption data. (A8, Al)

116-V. A Survey of the Development of Creep-Resisting Alloys. N. P. Allen. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 1-10.

Trend of researches undertaken after 1939 in Great Britain, America, and Germany to provide improved materials for use in gas turbines. The properties of alloys that were relied upon in each country are described in terms of stresses giving plastic deformations of 0.1% in 1000 hr. 17 ref. (Q3, AY, SG-h)

117-V. Nickel-Chromium-Titanium Alloys of the Nimonic 80 Type. L. B. Pfeil, N. P. Allen, and C. G. Conway. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 37-45.

Use in gas-turbine service. Research methods used to determine the solid solubility of selected addition agents, the response of the alloys to heat treatment, their forgeability, and their high-temperature properties. The composition and structure of Nimonic 80 and 80A in relation to their high-temperature mechanical properties and creep resistance. 24 ref. (Ni, SG-h)

118-V. Research and Development on High-Temperature Materials. C. A. Bristow and H. Sutton. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 289-292.

The importance of availability in deciding on the constituent elements for high-temperature alloys. Metallurgical factors affecting the choice of metallic materials illustrated by various types of alloy. Examples of long-range fundamental research on such work. 15 ref. (SG-h)

119-V. K-150 Fills Gap Between Established Aluminum Alloys. Dudley T. Ross. *Materials & Methods,* v. 34, Aug. 1951, p. 74-75.

Mechanical properties and applications of K-150, a new Al alloy developed by Kaiser Aluminum & Chemical Corp. to fill the gap between 3S and 52S. Strength is about 22% greater than 3S. Cost is only 1c more per lb. than 3S, and is at least 3c less than 52S in the same gages.
(Q general, T general, Al)

120-V. Low Carbon Steels. *Materials & Methods,* v. 34, Aug. 1951, p. 99.

Data sheet gives compositions, physical and mechanical properties, thermal treatments, fabricating properties, corrosion resistance, available forms, and uses for five of the above steels. (CN)

121-V. Medium Carbon Steels. *Materials & Methods,* v. 34, Aug. 1951, p. 101.

Data sheet gives compositions, physical properties, mechanical properties, thermal treatments, fabricating properties, corrosion resistance, available forms, and uses for four of the above steels. (CN)

122-V. Palladium Alloys. Tom Bishop. *Metal Progress,* v. 60, Aug. 1951, p. 67.

Rose bowl made of Pd hardened with Rh, presented to Princess Margaret at a recent London ceremony. Mechanical, physical, and corrosion-resisting properties of the pure metal and the alloy; also melting practice. (Pd)

123-V. Boron Steels. *Metal Progress,* v. 60, Aug. 1951, p. 81-92.

Report prepared by the Panel on Substitution of Alloying Elements in Engineering Steels, Metallurgical Advisory Board. Purpose is to summarize steelmaking practices, applications, and properties as a reference for furthering applications of the boron steels and thereby conserving critical alloys. The information was obtained by a comprehensive survey of the literature and from unpublished reports and communications from producers and users of boron steels. (AY).

124-V. Nickel Shortage Shifts Focus to Type 430 Stainless. *Steel,* v. 129, Aug. 20, 1951, p. 66-68, 86, 88.

Mechanical and physical properties, corrosion resistance, fabrication, welding, and applications of Type 430 stainless, believed to be the best all-around material among the non-Ni-bearing grades. (SS)

125-V. Some Properties and Applications of Spheroidal-Graphite Cast Iron. A. B. Everest. *Proceedings of the Institute of British Foundrymen,* v. 43, 1950, p. A35-A45; disc., p. A45-A51.

Previously abstracted from *Institute of British Foundrymen.* (Paper No. 963.) See item 157-V, 1950. (CI)

126-V. Titanium—Tomorrow's Metal. H. P. Croft. *Canadian Metals,* v. 14, Aug. 1951, p. 10-11.

Reasons why it is believed that Ti will repeat the success story of aluminum. Properties and potential applications. (Ti)

127-V. Nickel-Aluminum Bronze. James S. Vanick. *Foundry,* v. 79, Aug. 1951, p. 98-102; Sept. 1951, p. 108-111, 192, 195.

Physical and mechanical properties of Al bronzes containing Ni additions up to 5%. In this role, Ni

contributes strength plus resistance to corrosion, wear and heat. Concluding installment: Heat treatment and applications of castings poured in Al bronze alloys, containing Ni and Fe in amounts up to 5%. (Cu)

128-V. Recent Progress in the Metallurgy of Copper and Copper Alloys. Maurice Cook. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 1029-1046; disc., p. 1047-1093.

New developments in methods of production and fabrication, and in applications. (Cu)

129-V. The Nickel Industry: Twenty Years On. William Griffiths. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 848-880; disc., p. 1047-1093.

World demand, fluctuations, mining developments, smelting and refining practice, and developments in application of Ni and its alloys, for the period 1929-1949. 46 ref. (Ni)

130-V. Extraction, Alloying and Fabrication of Magnesium. C. J. P. Ball. *Fourth Empire Mining and Metallurgical Congress, Proceedings,* 1950, p. 1004-1028; disc., p. 1047-1093.

Raw materials, equipment, procedures, properties, and applications. (Mg)

131-V. Nickel. J. V. Beall. *Journal of Metals,* v. 3, Sept. 1951, p. 712-719.

Previously abstracted from *Mining Engineering.* See item 106-V, 1951. (Ni)

132-V. Increasing Titanium Metal Production. *Magazine of Tooling and Production,* v. 17, Sept. 1951, p. 110-111, 114.

First large-scale and self-contained plant for titanium production, soon to be constructed at Henderson, Nevada, by Titanium Metals Corp. of America, a project which will increase world production of Ti eightfold. Production, properties, and applications of titanium are also reviewed. (Ti)

133-V. Beryl. H. Manley. *Mine & Quarry Engineering,* v. 17, Sept. 1951, p. 305-307.

Minerology, geology, uses, world production, concentration, and toxic properties. (Be)

134-V. South African Platinum Metals. A. Graham Thomson. *Mining Journal,* v. 237, Aug. 17, 1951, p. 160-161.

Development of the industry. Chemical applications of the metal. Future prospects. (EG-c)

135-V. Tin; Tungsten. *Westinghouse Engineer,* v. 11, Sept. 1951, p. 151-157.

Preparation, properties, and uses of each. Data on prices are graphed. (Sn, W)

136-V. (Pamphlet) **An Introduction to Aluminium and Its Alloys.** Aluminium Development Association, Information Bulletin 1, Dec. 1950, 52 pages.

First of a series describing properties, treatment, manipulation, and finishing of Al and its alloys. Two functions of the book are: first, to introduce readers to the metal Al and its alloys; second, to introduce those concerned to the more technical bulletins in the series. Historical and geographical aspects are treated more fully than in the other publications, but accounts of properties and working methods are very brief. (Al)

137-V. (Book) **The Chemistry of Uranium, Part I. The Element, Its Binary, and Related Compounds.** Ed. 1. Joseph J. Katz and Eugene Rabinowitch. 609 pages. 1951. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. (National Nuclear Energy Series, Manhattan Project Technical Section, Div. VIII, Vol. 5.) $7.25.

One of a series prepared as a record of research done under the Manhattan Project and the Atomic Energy Commission. The isotopic composition and atomic weight of natural uranium and the properties of the atom. Includes a general survey of occurrence of uranium in nature. Extraction from ores, preparation of the metal, its chemical and physical properties, intermetallic compounds and alloy systems, and the binary compounds of uranium. (U)

138-V. (Pamphlet) **Hastelloy.** Jan. 1951, 40 pages. Haynes-Stellite Div., Union Carbide and Carbon Corp., Kokomo, Ind.

Physical and chemical properties of Hastelloy alloys, the forms in which they are available, and the recommended procedures for using them. (Ni)

139-V. (Book) **Vanadium Steels and Irons.** 83 pages. 1951. Vanadium Corp. of America, 420 Lexington Ave., New York 17, N.Y.

Spiral-bound book of data sheets assembled to give designing engineers concise, detailed, and readily accessible information on alloy steels and iron containing V. Compositions, heat treatments, and mechanical properties are given as aids to successful design and to selection of materials suitable for specific applications and methods of fabrication. The 180 different compositions covered include constructional steels, spring steels, plate and sheet steels, tool steels, cast steels, and alloyed irons. Detailed index of applications and recommended compositions for each. (AY, CI)

140-V. Metallurgy in Tool Design and Production. E. D. Wiard. *Machinery* (American), v. 58, Sept. 1951, p. 144-148.

Surveys information necessary for an understanding of tool material applications. Compositions of the high speed steels most commonly used for cutting tools and physical properties of these steels are tabulated. Emphasizes effects of heat-treatment variables. (TS)

141-V. Tin and Tungsten—Their Past, Present and Future. Charles A. Scarlott. *Materials & Methods,* v. 34, Sept. 1951, p. 69-73.

Sources, reserves, price fluctuations, natural forms, and applications of two scarce and strategically important metals.
(A4, B10, T general, Sn, W)

142-V. The Wrought Phosphor Bronzes. John L. Everhart. *Materials & Methods,* v. 34, Sept. 1951, p. 97-112.

Special report covers standard grades and available forms; engineering properties; forming and fabricating; joining practice; surface finishing; and applications. (Cu)

143-V. Ductile Zirconium Metal—Its Production and Properties. G. L. Miller. *Times Review of Industry,* v. 5, Sept. 1951, p. 29-30.

Previously abstracted from *Metallurgia.* See item 85-V, 1951. (Zr)

144-V. Spotlight on Zirconium. *Chemical Week,* v. 69, Oct. 6, 1951, p. 27-28.

Present outlook for Zr. Properties that make it a superior material of construction. (Zr)

145-V. Malleable Iron: Then and Now. James H. Lansing. *Foundry,* v. 79, Oct. 1951, p. 92-97, 267-268.

Development of malleable iron castings from their earliest application for harness hardware and wagon parts to their widespread use today. (CI)

146-V. Suggested Emergency Steel Alternates for Some Standard Alloy Grades. *Iron Age,* v. 168, Oct. 4, 1951, p. 239.

Suggestions in tabular form with cautions as to use. (AY)

147-V. New Steel Compositions to Conserve Critical Alloying Elements. *Materials & Methods,* v. 34, Oct. 1951, p. 135, 137.

The new grades of steel developed to conserve Mn, Ni, Cr and Mo are tabulated and their compositions shown. (AY, ST)

148-V. Niobium and Tantalum in Modern Industry. *Mines Magazine,* v. 41, Sept. 1951, p. 18, 23, 30, 33.

A survey stressing primary uses. (Cb, Ta)

149-V. Rhenium—A Rare Metal. A. D. Melaven. *Mines Magazine,* v. 41, Sept. 1951, p. 24.

Growing importance and possible applications. (Re)

150-V. Aluminum—a Metallurgical Marvel. J. C. Pierce. *Compressed Air Magazine,* v. 56, Oct. 1951, p. 256-262.

History of its growth and applications in industry. (Al)

151-V. Recent Metals and Alloys. A. G. Quarrell. *Engineering,* v. 172, Sept. 14, 1951, p. 343-344; Sept. 21, 1951, p. 378-379.

The availability of various nonferrous metals and alloys. Applications. Effect on composition of existing austenitic alloy steels, Cu alloys, and cast irons of addition of nonferrous elements. Progress made in the field of magnetic materials. (EG-a, AY, Cu, CI, SG-n)

152-V. Properties and Uses of Zinc and Its Alloys. W. H. Dennis. *Mine & Quarry Engineering,* v. 17, Oct. 1951, p. 325-327.

A survey. (Zn)

153-V. Boron Engineering Steels. Charles M. Parker. *Steel,* v. 129, Oct. 15, 1951, p. 76-79.

Properties and applications.
(AY, B)

154-V. (Pamphlet) **Haynes Alloys for High-Temperature Service.** 1950, 96 pages. Haynes Stellite Div., Union Carbide and Carbon Corp., Kokomo, Ind.

Purpose is to give engineers and metallurgists data that will serve as a useful guide in the selection of alloys for service at high temperature. It includes Co-base, Ni-base, and Fe-base alloys. (Co, Ni, Fe, SG-h)

155-V. (Book) **Hartmetalle: Werkstoffbearbeitung, Entwicklung, und Anwendung der Hartmetalle.** (Hard Metals: Industrial Processing, Development, and Application of Hard Metals.) Eugen Hirschfield. 264 pages. 1949. Schweizer Druck und Verlagshaus A.G., Zurich, Switzerland.

Part I: Basic factors of machining, such as cutting resistance, cutting temperature, and cutting time. Part II: Hard metals as such; powder metallurgy and properties of hard metals. Part III: The various uses of hard metals. Part IV: Problems which arise in connection with their use.
(G17, H general, EG-d, SG-j)

156-V. Titanium—1951. Joseph A. O'Connor. *Chemical Engineering,* v. 58, Oct. 1951, p. 136-139.

Processes, plants, production, and possibilities. (Ti)

157-V. Cast Alloy Reference Sheet. N. S. Mott. *Chemical Engineering Progress* (Engineering Section), v. 47, Oct. 1951, p. 542.

Data on machinability, heat treatment and weldability of low-carbon 18-8 stainless. Mechanical and physical properties, as well as corrosion resistance to a large number of common chemicals, are tabulated. (R5, SS)

158-V. Nickel-Silver Castings. James S. Vanick. *Foundry,* v. 79, Nov. 1951, p. 92-95, 254-258.

Varied applications, mechanical properties, corrosion resistance, cleaning and finishing, foundry practice, and effects of alloying agents. (Cu)

159-V. Wrought Copper and Copper-Base Alloys. C. L. Bulow. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2218-2226.

Reviews the literature on alloy compositions, specifications, mechanical and physical properties, fabrication properties and techniques, and corrosion resistance of copper and copper alloys under a wide variety of conditions. 162 ref. (Cu)

160-V. Iron, Mild Steels, and Low-Alloy Steels. C. P. Larrabee and B. J. Kelly. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2239-2242.

General trend in the literature during the past year. Spheroidal cast iron has continued to find increased use as an engineering material. From the performance data gathered to date it is expected that nodular graphite cast iron will replace other grades for many uses. 49 ref. (ST, AY, CI)

161-V. Nickel and High-Nickel Alloys. H. O. Teeple. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2242-2251.

Development of new alloys or improvements in present ones and studies of their physical properties; developments in the fabrication and working of these alloys; and developments in the applications of these alloys with particular reference to the chemical and process industries. 231 ref. (T29, Ni)

162-V. Stainless Steels and Other Ferrous Alloys. Walter A. Luce. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2258-2271.

Comprehensive literature survey. Methods for reclaiming critical elements and substituting Ti for Cb. The sigma phase, its nature, occurrence and effects on stainless steel. Data on corrosion and heat resisting alloys and application in industry. A resume of stainless-steel production procedures. 328 ref. (SS, SG-g, h)

163-V. Tin and Its Alloys. Robert J. Nekervis. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2272-2275.

A literature review. Developments in electroplating, solders, and basic research are emphasized. 147 ref. (L17, K7, Sn)

164-V. Less Common Metals. D. B. Broughton. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2280-2282.

Surveys literature on the properties of Ti and its alloys, also Zr, Ta, Mo, and noble metals. 51 ref. (Ti, Ta, Mo, Ag, EG-c)

165-V. Properties of Chemical Engineering Materials of Construction. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2283-2294.

Presented in tabular form for carbon and graphite, cements, stainless steel and other ferrous alloys, tin and its alloys, and wood. 21 ref. (SS, C, Fe, ST, Sn)

166-V. What Type High Alloy for Castings Now? E. A. Schoefer. *Industrial Heating,* v. 18, Oct. 1951, p. 1799-1800, 1802, 1804, 1806.

Alloy conservation, alloy types, and possible alloy limitations with emphasis on high-temperature applications. (AY, SS, SG-h)

167-V. Recent Aluminum Progress: New Alloys, Fabricating Methods, Finishes, Joining Techniques, and Several Significant Applications. Edward S. Bunn. *Modern Metals,* v. 7, Oct. 1951, p. 46-47, 49-53.

(Al)

168-V. Thermostatic Bimetals. (In Polish.) E. Zalesinski. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 3, 1951, p. 255-258.

Forms, compositions, applications, methods of casting, surface treatment before bonding, and rolling. (SG-s)

169-V. New Carbides Make a Tougher Metal. *Business Week,* Nov. 3, 1951, p. 42-45.

Production of chromium carbide. Applications in which resistance to wear, corrosion, and heat are a must. Uses of tungsten carbide. (T general, C-n, Cr, W)

170-V. The Rare Earths. Frank H. Spedding. *Scientific American,* v. 185, Nov. 1951, p. 26-30.

Abundance of rare earths as fission products of uranium has stimulated a new interest in their possible usefulness in the laboratory and in industry. (EG-g)

171-V. Chrome Carbides Possess High Resistance Qualities. *Tool Engineer,* v. 27, Nov. 1951, p. 49.

A new family of metallic carbides contains approximately 70% Cr. They are extremely resistant to abrasion, erosion and corrosion; are lighter than tungsten carbide; have a coefficient of thermal expansion approximately the same as that of steels; are affected very slightly by oxidation, even at high temperatures; and are completely non-magnetic. Applications. (C-n, Cr)

172-V. Study of Some Properties of Nodular Graphite Cast Irons. (In French.) Marcel Ballay, Raymond Chavy, and Jacques Grilliat. *Fonderie,* Aug.-Sept. 1951, p. 2589-2604.

Various types made in France, their mechanical properties, and their thermal treatment. (CI)

173-V. Development and Possible Uses of High-Purity Aluminum. (In German.) W. Helling and H. Neunzig. *Metall,* v. 5, Oct. 1951, p. 424-426.

Production and properties. Its high resistance to corrosion makes it an ideal metal for bright finishing of certain articles. (L general, T general, Al)

174-V. Rhenium and Its Present-Day Commercial Applications. (In German.) Walter Noddack and Ida Noddack. *Werkstoff und Korrosion,* v. 2, Aug. 1951, p. 296-298.

Surveys properties and applications. (Re)

175-V. Antimony. (In Portuguese.) Vadim M. Alexeiev. *Engenharia, Mineracao e Metalurgia,* v. 16, July-Aug. 1951, p. 121-125.

Occurrence of antimony in Brazil and its distribution in the rest of the world, its physical and chemical properties, use, production, smelting, and role in industry. Diagrams show ore-beneficiation flowsheets and smelting and refining equipment. (B10, C21, Sb)

176-V. Important New Carbide Developed by Carboloy. *Machinery* (American), v. 58, Nov. 1951, p. 185-186.

Properties and applications of "Series 600" alloys, which contain approximately 70% Cr. (Cr, C-n)

177-V. Chrome Carbide: A New Man-made Metal. *Magazine of Tooling and Production,* v. 17, Nov. 1951, p. 78, 82, 86.

New carbide group having physical properties better in many respects than conventional tungsten carbides and now in limited pilot-plant production by Carboloy Dept., General Electric Co. Miscellaneous properties and applications. (C-n, Cr)

178-V. (Book) **New Approach to the Metallurgy of White Metals.** F. Vogel. 146 pages. 1949. Verlag Wilhelm Knapp, Halle (Saale) Germany. 13s., 2d.

Originally published in 1933; now re-issued in an enlarged edition. The literature covered surveys only a limited number of publications after 1940. Of particular use to metallurgists dealing with bearing and Babbitt metals. (SG-c)

179-V. (Book) **Stainless Steels in Industry. Vol. I. Stainless Iron and Steel. Ed. 3.** J. H. G. Monypenny. 523 pages. Chapman and Hall, Ltd., 37 Essex St., London W.C.2, England. 45s.

Varieties of stainless steels in commercial use, with compositions, characteristic features, and properties of particular importance to the engineer and metalworker. Methods recommended for fabrication of the steels into useful equipment, and their response under varying conditions of corrosive attack and temperature. Factors affecting selection of suitable forms of stainless steel for specific industries. (T general, SS)

ADDRESSES OF PUBLICATIONS

I. ENGLISH LANGUAGE JOURNALS

A

Acta Chemica Scandinavica (mostly English), Frenckellin Kirjapaino Osakeyhtiö, Helsinki, Finland.

Acta Crystallographica (mostly English), Cambridge University Press, Bentley House, Euston Rd., London N.W.1, England; or American Institute of Physics, 57 E. 55th Street., New York 22, N. Y.

Aero Digest, Aeronautical Digest Publishing Corp., 515 Madison Ave., New York 22, N. Y.

Aeronautical Engineering Review, Institute of Aeronautical Sciences, 2 E. 64th St., New York 21, N. Y.

Aeroplane, Temple Press Ltd., Bowling Green Lane, London E.C.1, England.

Agricultural Engineering, American Society of Agricultural Engineers, 505 Pleasant St., St. Joseph, Mich.

Agronomy Journal, 2702 Monroe St., Madison 5, Wis.

Aircraft Engineering, Bunhill Publications, Ltd., 12 Bloomsbury Square, London W.C.1, England.

Aircraft Production, Iliffe & Sons, Ltd., Dorset House, Stamford St., London S.E.1, England.

Alloy Metals Review, High Speed Steel Alloys, Ltd., Ditton Road, Widnes, Lancashire, England.

American Ceramic Society, Bulletin, 2525 N. High St., Columbus 2, Ohio.

American Ceramic Society, Journal, 2525 N. High St., Columbus 2, Ohio.

American Chemical Society, Journal, 1155 16th St., N. W., Washington 6, D. C.

American Concrete Institute, Journal, 18263 W. McNichols Rd., Detroit 19, Mich.

American Concrete Institute, Proceedings, 18263 W. McNichols Rd., Detroit 19, Mich.

American Electroplaters Society, Proceedings, 473 York Rd., Jenkintown, Pa.

American Foundryman, American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill.

American Foundrymen's Society, Transactions, 616 S. Michigan Ave., Chicago 5, Ill.

American Gas Association, Monthly, American Bldg., Brattleboro, Vt.; or 420 Lexington Ave., New York 17, N. Y.

American Institute of Electrical Engineers, Transactions, 33 W. 39th St., New York 18, N. Y.

American Institute of Mining and Metallurgical Engineers, Proceedings, Blast Furnace, Coke Oven, and Raw Materials Committee, Iron and Steel Division, 29 W. 39th St., New York 18, N. Y.

American Institute of Mining and Metallurgical Engineers, Proceedings, Electric Furnace Steel Conference, 29 W. 39th St., New York 18, N. Y.

American Institute of Mining and Metallurgical Engineers, Proceedings, National Open Hearth Committee, Iron and Steel Division, 29 W. 39th St., New York 18, N. Y.

American Institute of Mining and Metallurgical Engineers, Transactions, 29 W. 39th St., New York 18, N. Y.

American Journal of Physics, American Institute of Physics, Prince and Lenox Sts., Lancaster, Pa.; or 57 E. 55th St., New York 22, N. Y.

American Journal of Science, Sterling Tower, Yale University, New Haven, Conn.

American Machinist, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

American Oil Chemists' Society, Journal, 35 E. Wacker Dr., Chicago 1, Ill.

American Paint Journal, 3717 Washington Ave., St. Louis 8, Mo.

American Paper Converter, Howard Pub-

lishing Co., 111 W. Washington St., Chicago, 2, Ill.

American Petroleum Institute, Proceedings, 50 W. 50th St., New York 20, N. Y.

American Pressman, International Printing Pressmen and Assistants Union of North America, Pressmen's Home, Tenn.

American Railway Engineering Association, Bulletin, 59 E. Van Buren St., Chicago 5, Ill.

American Society of Mechanical Engineers, Transactions, 29 W. 39th St., New York 18, N. Y.

American Society for Metals, Transactions, 7301 Euclid Ave., Cleveland 3, Ohio.

American Society of Naval Engineers, Journal, 605 F. St., N.W., Washington 4, D. C.

American Society for Testing Materials, Bulletin (see ASTM Bulletin).

American Society for Testing Materials, Proceedings, 1916 Race St., Philadelphia 3, Pa.

American Waterworks Association, Journal, 521 5th Ave., New York 18, N. Y.

American Welding Society (see Welding Journal).

American Zinc Institute, Journal, 60 E. 42nd St., New York 17, N. Y.

Analytical Chemistry, American Chemical Society, 1155 16th St., N. W., Washington 6, D. C.

Applied Scientific Research, Martinus Nighoff, The Hague, Netherlands.

Applied Hydraulics, Hydraulics Publishing Co., 1240 Ontario St., Cleveland 13, Ohio.

Applied Mechanics Reviews, American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

Architectural Forum, 540 N. Michigan Ave., Chicago 11, Ill.

Architectural Record, F. W. Dodge Corp., 10 Ferry St., Concord, N. H.; or 119 W. 40th St., New York 18, N. Y.

Arkiv für Fysik (mostly English), Almquist and Wiksells Boktryckeri A. B., Stockholm, Sweden.

Association of Iron and Steel Engineers (see Iron and Steel Engineer).

ASTM Bulletin, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Atomics (London), Leonard Hill Technical Group, 17 Stratford Place, London W.1., England.

Australasian Engineer, 20 Loftus St., Sydney, Australia.

Australasian Institute of Mining and Metallurgy, Osborne House, 399 Little Collins St., Melbourne, Australia.

Australian Journal of Applied Science, Commonwealth Scientific and Industrial Organization, 314 Albert St., East Melbourne C. 2, Victoria, Australia.

Australian Journal of Scientific Research, Commonwealth of Scientific and Industrial Organization, 314 Albert St., East Melbourne C. 2, Victoria, Australia.

Automobile Engineer, Iliffe & Sons, Ltd., Dorset House, Stamford St., London S.E.1, England.

Automotive Industries, Chilton Co., Chestnut and 56th St., Philadelphia 39, Pa.

Aviation Age, 205 E. 42nd St., New York 17, N. Y.

Aviation Week, 99-129 N. Broadway, Albany 1, N. Y.

B

Bell Laboratories Record, Bell Telephone Laboratories, Inc., 463 West St., New York 14, N. Y.

Bell System Technical Journal, American Telephone and Telegraph Co., 195 Broadway, New York 7, N. Y.

Better Enameling, Chicago Vitreous Enamel Products Co., 1427 S. 55th Court, Cicero 50, Ill.

Biometrics, The Biometric Society, 52 Hillhouse Ave., New Haven, Conn.

Birmingham Metallurgical Society, Journal, 253 Longbridge Lane, Northfield, Birmingham 31, England.

Blast Furnace, Coke Oven, and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, 29 W. 39th St., New York 18, N. Y.

Blast Furnace and Steel Plant, Steel Publications, Inc., 4 Smithfield St., Pittsburgh 30, Pa.

Bookbinding and Book Production, 50 Union Square, New York 2, N. Y.

Brick and Clay Record, Industrial Publications, Inc., 5 S. Wabash Ave., Chicago 3, Ill.

British Cast Iron Research Association Journal of Research and Development, Alvechurch, Birmingham, England.

British Journal of Applied Physics, Institute of Physics, 47 Belgrave Square, London S.W.1, England.

British Plastics, Iliffe & Sons, Ltd., Dorset House, Stamford St., London S.E.1, England.

British Steelmaker, 7 Chesterfield Gardens, Curzon St., London W.1, England.

Brown Boveri Review, Brown Boveri Co., Ltd., Baden, Switzerland.
Bulletin of the Atomic Scientists, Educational Foundation for Nuclear Science, Inc., 956 E. 58th St., Chicago 37, Ill.
Bulletin of the Electrotechnical Laboratory (Japan), Agency of Industrial Science and Technology, Nagata-cho, Cheyoda-ku, Tokyo, Japan.
Bulletin of the Institution of Mining and Metallurgy, Salisbury House, Finsbury Circus, London E.C.2, England.
Bulletin of the Tokyo Institute of Technology, Oh-Kayama, Meguroku, Tokyo, Japan.
Business Week, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

C

CADO Technical Data Digest, Central Air Documents Office, Attn: Technical Data Digest, U. B. Bldg., Dayton, Ohio.
Canadian Chemical Processing (formerly Canadian Chemistry and Process Industries), 137 Wellington St., West, Toronto, Ont., Canada.
Canadian Institute of Mining and Metallurgy, Transactions (see Canadian Mining and Metallurgical Bulletin).
Canadian Journal of Chemistry, National Research Council of Canada, Ottawa, Ont., Canada.
Canadian Journal of Physics, National Research Council of Canada, Ottawa, Ont., Canada.
Canadian Journal of Research, National Research Council of Canada, Ottawa, Ont., Canada.
Canadian Journal of Technology, National Research Council of Canada, Ottawa, Ont., Canada.
Canadian Metals, Westman Publications, Ltd., 137 Wellington St., West, Toronto, Ont., Canada.
Canadian Mining Journal, National Business Publications, Ltd., Gardenvale, Quebec, Canada.
Canadian Mining and Metallurgical Bulletin, Canadian Institute of Mining and Metallurgy, 911 Drummond Bldg., Montreal, Quebec, Canada.
Casting Research Laboratory, Report (Japan)(In English), Waseda University, 1-500 Totsuka-cho, Shijuku-ku, Tokyo, Japan.
Central Air Documents Office Technical Data Digest (see CADO Technical Data Digest).
Ceramic Age, Ceramics Publishing Co., 421 Parker St., Newark 4, N. J.
Ceramic Industry, Industrial Publications, Inc., 5 S. Wabash Ave., Chicago 3, Ill.
Ceramics, Arrow Press, Ltd., 157 Hagden Lane, Watford, Herts, England.
Chemical Age, Bouverie House, 154 Fleet St., London E.C.4, England.
Chemical Engineering, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.
Chemical and Engineering News, American Chemical Society, 1155 16th St., N.W., Washington 6, D. C.
Chemical Engineering Progress, American Institute of Chemical Engineers, 120 E. 41st St., New York 17, N. Y.; or 15 N. 7th St., Philadelphia 6, Pa.
Chemical Industries (see Chemical Week).
Chemical Industries Week (see Chemical Week).
Chemical, Metallurgical and Mining Society of South Africa, Journal, Kelvin House, Marshall and Hollard Sts., Johannesburg, South Africa.
Chemical Week, McGraw-Hill Bldg., 330 W. 42nd St., New York 18, N. Y.
Chemical Processing, Putnam Publishing Corporation, 111 E. Delaware Pl., Chicago 11, Ill.
Chemical Society, Journal, Burlington House, London W.1, England.
Chemist, American Institute of Chemists, 60 E. 42nd St., New York 17, N. Y.
Chemist Analyst, J. T. Baker Chemical Co., Phillipsburg, N. J.
Chemistry and Industry, Society of Chemical Industry, 56 Victoria St., London S.W.1, England.
Civil Engineering, American Society of Civil Engineers, 33 W. 39th St., New York, N. Y.
Coal Age, McGraw-Hill Building, 330 W. 42nd St., New York 18, N. Y.
Coke and Gas, Tothill Press, Ltd., 33 Tothill St., Westminster, London S.W.1, England.
Colliery Guardian, 30-31 Furnival St., Holborn, London E.C.4, England.
Combustion, Combustion Publishing Co., 220 Madison Ave., New York 16, N. Y.
Compressed Air Magazine, Phillipsburg, N. J.
Corrosion, National Association of Corrosion Engineers, 919 Milam Bldg., 803 Texas Ave., Houston 2, Tex.

D

Die Castings (see Precision Metal Molding).

Diesel Power and Diesel Transportation, Diesel Publications, Inc., 192 Lexington Ave., New York 16, N. Y.

Drilling, Associated Publishers, Inc., 2115 N. St. Paul St., Dallas, Tex.

Drilling Contractor, American Association of Oilwell Drilling Contractors, 321 Reserve Loan Life Bldg., 505 N. Ervay St., Dallas 1, Tex.

E

Economic Geography, Clark University, Worcester 3, Mass.

Economic Geology and the Bulletin of the Society of Economic Geologists, Economic Geology Publishing Co., M. M. Leighton, Business Manager, Urbana, Ill.

Edgar Allen News, Edgar Allen & Co., Ltd., Imperial Steel Works, Sheffield 9, England.

Electric Furnace Steel Conference Proceedings, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Electric Light and Power, Electrical Publications, Inc., 22 E. Huron St., Chicago 11, Ill.

Electrical Communication, International Telephone and Telegraph Corp., 67 Broad St., New York 4, N. Y.

Electrical Engineering, American Institute of Electrical Engineers, 33 W. 39th St., New York 18, N. Y.

Electrical Manufacturing, Gage Publishing Co., 1250 6th Ave., New York 20, N. Y.

Electrical World, McGraw-Hill Publishing Co., 99-129 N. Broadway, Albany 1, N. Y., or 330 W. 42nd St., New York 18, N. Y.

Electrochemical Society, Journal, 235 W. 102nd St., New York 25, N. Y.

Electrodepositors' Technical Society, Journal, 27 Islington High St., London N.1, England.

Electronic Engineering, 28 Essex St., Strand, London W.C.2, England.

Electronics, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

Electroplating and Metal Finishing, 83-85 Udney Park Rd., Teddington, Middlesex, England.

Empire Mining and Metallurgical Congress Proceedings, Fourth, 436 Salisbury House, Finsbury Circus, London E.C.2, England.

Engineer, 28 Essex St., Strand, London, W.C.2, England.

Engineering, 35-36 Bedford St., Strand, London W.C.2, England.

Engineering and Chemical Digest, S. A. Trade & Technical Publishing Co. (Pty.), Ltd., P. O. Box 129, East London, South Africa.

Engineering Experiment Station News (see Ohio State University, Engineering Experiment Station News.

Engineering Journal, Engineering Institute of Canada, 2050 Mansfield St., Montreal, Canada.

Engineering and Mining Journal, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

Engineering News-Record, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

Engineers' Digest, 120 Wigmore St., London W.1, England; or 360 Madison Ave., New York 17, N. Y.

F

Factory Management and Maintenance, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

Faraday Society, Transactions, 6 Gray's Inn Square, London W.C.1, England; or Aberdeen Univ. Press, Ltd., 6 Upper Kirkgate, Aberdeen, Scotland.

Finish, Dana Chase Publications, 360 N. Michigan Ave., Chicago 1, Ill.

Food Engineering, 99-129 N. Broadway, Albany 1, N. Y.; or 330 W. 42nd St., New York 18, N. Y.

Foreign Commerce Weekly, Supt. of Documents, U. S. Government Printing Office, Washington, 25, D. C.

Fortune, Time, Inc., 540 N. Michigan Ave., Chicago 11, Ill.

Foundry, Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio.

Foundry Trade Journal, 49 Wellington St., Strand, London W.C.2, England.

Fourth Empire Mining and Metallurgical Congress, Proceedings, 436 Salisbury House, Finsbury Circus, London E.C.2, England.

Franklin Institute, Journal, Franklin Institute of the State of Pennsylvania, Prince and Lemon St., Lancaster, Pa.; or Benjamin Franklin Parkway at 20th St., Philadelphia, Pa.

Frontier, Armour Research Institute, 35 E. 33rd St., Chicago 16, Ill.

G

Gas Age, Moore Publishing Co., Emmett St., Bristol, Conn.

Gas Times, Arrow Press Ltd., 157 Hagden Lane, Watford, Herts., England.
Gas World, Bouverie House, Fleet Street, London E.C.4, England.
General Electric Review, General Electric Co., 1 River Rd., Schenectady 5, N. Y.
Glass Industry, Ogden Publishing Co., 55 W. 42nd St., New York 18, N. Y.

H

Heating, Piping, and Air Conditioning, Keeney Publishing Co., 6 N. Michigan Ave., Chicago 2, Ill.
Heating and Ventilating, Industrial Press, 148 Lafayette St., New York 13, N. Y.
Heat Treating, Metal Trade Publishers, Inc., 107 Vesey St., Newark, N. J.
Hydro Research News, Research Div., Hydro-Electric Power Commission of Ontario, Toronto, Ont., Canada.

I

Imperial College Chemical Engineering Society Journal, W. J. Fowler and Son, Ltd., London N.W.2, England.
Inco Magazine, International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Industrial Chemist (see Industrial Chemist and Chemical Manufacturer).
Industrial Chemist and Chemical Manufacturer, 33 Tothill St., Westminister, London S.W.1, England.
Industrial Diamond Review, N.A.G. Press, Ltd., 226 Latymer Court, Hammersmith, London W.6, England. (U. S. Agent: Henry Paulson & Co., 131 S. Wabash Ave., Chicago, Ill.)
Industrial and Engineering Chemistry, American Chemical Society, 1155 16th St., N.W., Washington 6, D.C.
Industrial Finishing, Practical Publications, Inc., 1142 N. Meridian St., Indianapolis 4, Ind.
Industrial Gas, Moore Publishing Co., 48 W. 38th St., New York 18, N. Y.
Industrial Gas (London) (see Gas World).
Industrial Heating, National Industrial Publishing Co., Union Trust Bldg., Pittsburgh 19, Pa.
Industrial Waste Conference, Proceedings, Purdue University, Lafayette, Ind.
Industry and Power, Maujer Publishing Co., St. Joseph, Mich.
Industry & Welding, Industrial Publishing Co., 1240 Ontario St., Cleveland 13, Ohio.
Institute of British Foundrymen, Proceedings, St. John St., Chambers, Deansgate, Manchester 3, England.
Institute of Metals, Journal, 4 Grosvenor Gardens, London S.W.1, England.
Institute of Petroleum, Journal, Manson House, 26 Portland Pl., London W. 1, England.
Institute of Radio Engineers, Proceedings, 1 E. 79th St., New York 21, N. Y.
Institute of Welding, Transactions, 2 Buckingham Palace Gardens, London S.W.1, England.
Institution of Engineers and Shipbuilders in Scotland, Transactions, Elmbank Crescent, Glasgow C.2, Scotland.
Institution of Mechanical Engineers, Proceedings, Storey's Gate, St. James Park, London, S.W.1, England.
Institution of Mining and Metallurgy, Bulletin, Salisbury House, Finsbury Circus, London E.C.2, England.
Institution of Mining and Metallurgy, Transactions, Salisbury House, Finsbury Circus, London E.C.2, England.
Institution of the Rubber Industry, Transactions, 12 Whitehall, London S.W.1, England.
Instrumentation, Minneapolis-Honeywell Regulator Co., Wayne and Windrim Ave., Philadelphia 44, Pa.
Instrument Society of America, Journal (see I.S.A. Journal).
Instruments, Instruments Publishing Co., 921 Ridge Ave., Pittsburgh 12, Pa.
Interchemical Review, Interchemical Corp., Research Laboratories, 432 W. 45th St., New York 19, N. Y.
International Chemical Engineering and Process Industries, Leonard Hill, Ltd. 17 Stratford Place, London, W.1, England; or British Publications, Inc., 150 E. 35th St., New York 16, N. Y.
IRI Transactions, Institution of the Rubber Industry, 12 Whitehall, London S.W. 1, England.
Iron Age, 100 E. 42nd St., New York 17, N.Y.
Iron and Steel, Louis Cassier Co., Ltd., Dorset House, Stamford St., London, S.E.1, England.
Iron and Steel Engineer, Association of Iron and Steel Engineers, 1010 Empire Bldg., Pittsburgh 22, Pa.
Iron and Steel Institute, Journal, 4 Grosvenor Gardens, London S.W.1, England.
I.S.A. Journal (bound with Instruments), Instruments Publishing Co., 921 Ridge Ave., Pittsburgh 12, Pa.

J

Japan Science Review (English), Association for Science Documents Information, Tokyo Institute of Technology, Ookayama, Meguro-ko, Tokyo, Japan.

Journal of the American Ceramic Society, 2525 N. High St., Columbus 2, Ohio.

Journal of the American Chemical Society, 1155 16th St., N.W., Washington 6, D. C.

Journal of the American Concrete Institute, 18263 W. McNichols Rd., Detroit 19, Mich.

Journal of the American Oil Chemists' Society, 35 E. Wacker Drive, Chicago 1, Ill.

Journal of the American Society of Naval Engineers, 605 F. St., N.W., Washington 4, D. C.

Journal, American Waterworks Association, 521 5th Ave., New York 18, N. Y.

Journal, American Zinc Institute, 60 E. 42nd St., New York 17, N. Y.

Journal of Applied Chemistry, Society of Chemical Industry, 56 Victoria St., London S.W.1, England.

Journal of Applied Mechanics, American Society of Mechanical Engineers, 29 W. 29th St., New York 18, N. Y.

Journal of Applied Physics, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Journal of the Birmingham Metallurgical Society, 253 Longbridge Lane, Northfield, Birmingham 31, England.

Journal of Chemical Education, 20th and Northampton St., Easton, Pa.

Journal of the Chemical, Metallurgical, and Mining Society of South Africa, Kelvin House, Marshall and Hollard St., Johannesburg, South Africa.

Journal of Chemical Physics, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Journal of the Chemical Society, Burlington House, London W.1, England.

Journal of Colloid Science, Academic Press, Inc., 125 E. 23rd St., New York 10, N. Y.

Journal of the Electrochemical Society, 235 W. 102nd St., New York 25, N. Y.

Journal of the Electrodepositors' Technical Society, 27 Islington, London, N.1, England.

Journal of the Franklin Institute, Franklin Institute of the State of Pennsylvania, Prince and Lemon Sts., Lancaster, Pa.; or Benjamin Franklin Parkway at 20th St., Philadelphia 3, Pa.

Journal of the Imperial College Chemical Engineering Society, W. J. Fowler and Son, Ltd., London N.W.2, England.

Journal of the Institute of Fuel, 18 Devonshire St., London W.1, England.

Journal of the Institute of Metals, 4 Grosvenor Gardens, London S.W.1, England.

Journal of the Institute of Petroleum, Manson House, 26 Portland Place, London W.1, England.

Journal of the Iron and Steel Institute, 4 Grosvenor Gardens, London S.W.1, England.

Journal of Metals, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Journal of the Oil & Colour Chemists' Association, Memorial Hall, Farringdon Street, London E.C.4, England.

Journal of the Optical Society of America, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.; or Prince and Lemon St., Lancaster, Pa.

Journal of Petroleum Technology, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Journal of Physical and Colloid Chemistry, William & Wilkins Co., Baltimore 2, Md.

Journal of Polymer Science, Interscience Publishers, Inc., 250 5th Ave., New York 1, N. Y.

Journal of Research of the National Bureau of Standards, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Journal of the Royal Aeronautical Society, 4 Hamilton Place, London W.1, England.

Journal of the Royal Technical College, The Journal Committee, Glasgow C.1, Scotland.

Journal of the Science of Food and Agriculture, Society of Chemical Industry, 56 Victoria St., London S.W.1, England.

Journal of Scientific & Industrial Research, 20 Pusa Road, New Delhi 5, India.

Journal of Scientific Instruments, Institute of Physics, 47 Belgrave Square, London S.W.1, England.

Journal of the Society of Chemical Industry, 56 Victoria St., London S.W.1, England.

Journal of the Society of Glass Technology, "Elmfield", Northumberland Rd., Sheffield 10, England.

Journal of Southern Research, Southeastern Research Institute, 5009 Peachtree Rd., Atlanta, Ga.

L

Lead Industries Association, Proceedings, 420 Lexington Ave., New York 17, N. Y.
Light Metal Age, 220 S. State St., Chicago 4, Ill.
Light Metals, Temple Press, Ltd., Bowling Green Lane, London E.C.1, England.
Linde Tips and Oxy-Acetylene Tips, Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.
Lubrication, Texas Co., 135 E. 42nd St., New York 17, N. Y.
Lubrication Engineering, American Society of Lubrication Engineers, 343 S. Dearborn St., Chicago 4, Ill.

M

Machine Design, Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio.
Machine and Tool Blue Book, Hitchcock Publishing Co., 222 E. Willow Ave., Wheaton, Ill.
Machinery (American), Industrial Press, 148 Lafayette St., New York 13, N. Y.
Machinery (London), Machinery Publishing Co., Ltd., National House, West St., Brighton 1, England.
Machinery Lloyd (Overseas Edition), 6 Cavendish Place, Regent St., London W. 1, England.
Magazine of Magnesium, Brooks & Perkins, Inc., 1950 W. Fort St., Detroit 16, Mich.
Magazine of Tooling and Production (formerly Tool and Die Journal), 1975 Lee Rd., Cleveland 18, Ohio.
Mainspring, Associated Spring Corp., Bristol, Conn.
Marine Engineering and Shipping Review, 30 Church St., New York 7, N. Y.
Master Boiler Makers' Association, Proceedings, 29 Parkwood St., Albany 3, N. Y.
Materials & Methods, Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y.
Mechanical Engineering, American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.
Metal Finishing, Finishing Publications, Inc., 11 W. 42nd St., New York 18, N. Y.
Metal Industry, Louis Cassier Co., Ltd., Dorset House, Stamford St., London S.E.1, England.
Metal Progress, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.
Metal Treating, Metal Treating Institute, 271 North Ave., New York, N. Y.
Metal Treatment and Drop Forging, 49 Wellington St., Strand, London W.C.2, England.
Metallurgia, Kennedy Press, Ltd., 31 King St., West, Manchester 3, England.
Microtecnic (English Edition), Editions Scriptar S. A., Lausanne, Switzerland (U. S. Agent: Overseas Publishers Representatives, 66 Beaver St., New York 4, N. Y.)
Midwest Engineer, Western Society of Engineers, 84 E. Randolph St., Chicago 1, Ill.
Mine & Quarry Engineering, 23 Great Queen St., London W.C.2, England.
Mines Magazine, Colorado School of Mines Alumni Assn., 734 Cooper Bldg., Denver 2, Colo.
Mining Congress Journal, American Mining Congress, 1102 Ring Bldg., Washington 2, D. C.
Mining Engineering, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.
Mining Journal, Mining Journal Ltd., 15 George St., Mansion House, E. C.4, England.
Mining Magazine, Mining Publications, Ltd., Salisbury House, London E.C.2, England.
Mining World, American Trade Journals, Inc., 121 2nd St., San Francisco 5, Calif.
Modern Industrial Press, Andresen, Inc., Windsor Manor, P. O. Box 687, Pittsburgh 30, Pa.
Modern Industry, Magazine of Industry, Inc., 400 Madison Ave., New York 17, N. Y.
Modern Lithographer and Offset Printer, F. W. Bridges, Ltd., 9 Frystone Ave., Croydon, Surrey, England.
Modern Lithography, Industry Publications, Inc., 254 W. 31st St., New York 1, N. Y.
Modern Machine Shop, Gardner Publications, Inc., 431 Main St., Cincinnati 2, Ohio.
Modern Metals, Modern Metals Publishing Co., 435 N. Michigan Ave., Chicago 11, Ill.
Modern Packaging, Modern Packaging Corp., Emmett St., Bristol, Conn.
Modern Plastics, 575 Madison Ave., New York 23, N. Y.

Monthly Business Review, Federal Reserve Bank of Cleveland, Cleveland 1, Ohio.
Murex Limited Review, Murex, Ltd., Rainham, Essex, England.

N

National Academy of Sciences, Proceedings, 2102 Constitution Ave., Washington 25, D. C.
National Association of Corrosion Engineers (see Corrosion).
National Bureau of Standards, Journal of Research (see Journal of Research of the National Bureau of Standards).
National Bureau of Standards, Technical News Bulletin, Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C.
National Lithographer, National Lithographer Publishing Co., 1 Sherman Ave. Jersey City 7, N. J.
Nature, Macmillan & Co., Ltd., St. Martin's St., London W.C.2, England.
National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, 29 W. 39th St., New York 18, N. Y.
New York Academy of Sciences, Transactions, Mt. Royal and Guilford Aves., Baltimore 2, Md.
Nickel Bulletin, Mond Nickel Co., Ltd., Sunderland House, Curzon St., London W.1, England.
Non-Destructive Testing, Society for Non-Destructive Testing, 1109 Hinman Ave. Evanston, Ill.
Nucleonics, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

O

Official Digest, Federation of Paint and Varnish Products Clubs, 1524 Chestnut St., Philadelphia, Pa.
Ohio State University, Engineering Experiment Station News, Columbus, Ohio.
Oil & Colour Chemists' Association, Journal, Memorial Hall, Farringdon St., London E.C.4, England.
Oil and Gas Journal, Petroleum Publishing Co., 211 S. Cheyenne Ave., Tulsa 1, Okla.
Optical Society of America, Journal, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.
Ordnance, American Ordnance Assn., 705 Mills Blvd., Washington 6, D. C.
Organic Finishing, Finishing Publications, Inc., 11 W. 42nd St., New York 18, N. Y.
Overseas Engineer, Temple Press Ltd., Bowling Green Lane, London E.C.1, Eng.

P

Paint Manufacture, Leonard Hill, Ltd., 17 Stratford Place, London W.1, England.
Paint, Oil & Chemical Review, Trade Review Co., 1607 Howard St., Chicago 26, Ill.
Paint and Varnish Production, Powell Magazines, Inc., 855 Avenue of the Americas, New York 1, N. Y.
Paint and Varnish Production Manager (see Paint and Varnish Production).
Paper Mill News, L. D. Post, Inc., 1309 Noble St., Philadelphia 23, Pa.
Paper Trade Journal, Lockwood Trade Journal Co., Inc. 15 W. 47th St., New York 19, N. Y.
PERA Bulletin, Production Engineering Research Association of Great Britain, Stavely Lodge, Melton Mowbray, Leicestershire, England.
Petroleum, Leonard Hill, Ltd., Stratford Place, London W.1, England.
Petroleum Engineer, Petroleum Engineer Publishing Co., Irwin-Keasler Bldg., Dallas 1, Tex.
Petroleum Processing, National Petroleum Publishing Co., 1213 W. 3rd St., Cleveland 13, Ohio.
Petroleum Refiner, Gulf Publishing Co., Box 2608, Houston 1, Tex.
Philips Research Reports, N. V. Philips' Gloeilampenfabrieken, Technical and Scientific Literature Dept., Eindhoven, Netherlands.
Philips Technical Review, N. V. Philips' Gloeilampenfabrieken, Technical and Scientific Literature Dept., Eindhoven, Netherlands.
Philosophical Magazine, Taylor and Francis, Ltd., Red Lion Court, Fleet St., London E.C.4, England.
Physica (mostly English), Dr. W. J. Beckman, Treasurer of the Physics Foundation, 6 Bijhouwerstraat, Utrecht, Netherlands.
Physical Review, American Institute of Physics, 57 E. 55th St., New York 22, N.Y.
Physical Society, Proceedings, 1 Lowther Gardens, Prince Consort Rd., London S.W.7, England.
Physics Today, American Institute of Physics, 57 E. 55th St., New York, N. Y.
Photoengravers Bulletin, American Photoengravers Assn., A-430, 116 W. Van Buren St., Chicago 4, Ill.

Pipe Line News, Oildom Publishing Co., 1217 Hudson Blvd., Bayonne, N. J.
Pit and Quarry, Complete Service Publishing Co., 431 S. Dearborn St., Chicago 5, Ill.
Plant, Plant Publishing Co., St. Joseph, Mich.
Plastics, Temple Press, Ltd., Bowling Green Lane, London E. C. 1, England.
Plastics Industry, Cooper Publishing Co., 420 Lexington Ave., New York 17, N. Y.
Plastics Institute, Transactions, The Adelphi, Adam St., London W.C. 2, England.
Plating, American Electroplaters' Society, 473 York Rd., Jenkintown, Pa.
Plating Notes, Defence Research Laboratories, Maribyrnong, Victoria, Australia.
Powder Metallurgy Bulletin, 320 Yonkers Ave., Yonkers 2, N. Y.
Power, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.
Power Engineering, Technical Publishing Co., 110 S. Dearborn St., Chicago 3, Ill.
Precision Metal Molding (formerly Die Castings, Technical Publishing Co., 1240 Ontario St., Cleveland 13, Ohio.
Printing Equipment Engineer, Willsea Publishing Co., 1276 W. 3rd St., Cleveland 13, Ohio.
Proceedings, American Electroplaters' Society, 473 York Rd., Jenkintown, Pa.
Proceedings of the American Concrete Institute, 18263 W. McNichols Rd., Detroit 19, Mich.
Proceedings, American Petroleum Institute, 50 W. 50th St., New York 20, N. Y.
Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 15, N. Y.
Proceedings of the Electric Furnace Steel Conference, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.
Proceedings of the Fifth Industrial Waste Conference (see Industrial Waste Conference, Proceedings).
Proceedings of the Institute of British Foundrymen, St. John St., Chambers, Deansgate, Manchester 3, England.
Proceedings of the I. R. E., Institute of Radio Engineers, 1 E. 79th St., New York 21, N. Y.
Proceedings, Lead Industries Association, 420 Lexington Ave., New York 17, N. Y.
Proceedings, Master Boiler Makers' Association, 29 Parkwood St., Albany 3, N. Y.
Proceedings of the National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.
Proceedings of the Physical Society, 1 Lowther Gardens, Prince Consort Road, London S.W.7, England.
Proceedings of the Royal Society, Cambridge University Press, Bentley House, London N.W.1, England; or 32 E. 57th St., New York 22, N. Y.
Proceedings of the Society for Experimental Stress Analysis, Central Square Sta., P.O. Box 168, Cambridge 39, Mass.
Process Engravers' Monthly, Art and Technics, Ltd., 50 Frith St., London W.1, England.
Product Engineering, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.
Production Engineering & Management, Bramson Publishing Co., 2842 W. Grand Blvd., Detroit 2, Mich.
Products Finishing, Gardner Publications, Inc., 431 Main St., Cincinnati 2, Ohio.
Progressive Architecture, Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y.
Pulp & Paper, 71 Columbia St., Seattle 4, Wash.

Q

Quarterly Reviews, The Chemical Society, Burlington House, Piccadilly, London W.1, England.

R

Radio-Electronics, 25 W. Broadway, New York 7, N. Y.
Radio & Television News, Ziff-Davis Publishing Co., 185 N. Wabash Ave., Chicago 1, Ill.
Railway Age, 30 Church St., New York 7, N. Y.
Railway Engineering and Maintenance, Simmons-Boardman Publishing Corp., 79 W. Monroe St., Chicago 3, Ill.
Railway Gazette, 33 Tothill St., Westminster, London S.W.1, England.
Railway Mechanical and Electrical Engineer, Simmons-Boardman Publishing Corp., 30 Church St., New York 7, N. Y.

Refractories Journal, London and Sheffield Publishing Co., Ltd., 7 Chesterfield Gardens, Curzon St., Mayfair, London W.1, England.

Refrigerating Engineering, American Society of Refrigerating Engineers, 40 W. 40th St., New York 18, N. Y.

Reports of the Casting Research Laboratory (Japan)(In English), Waseda University, 1-500 Totsuka-cho, Shinjuku-ku, Tokyo, Japan.

Reports on the Progress of Applied Chemistry, Society of Chemical Industry, 56 Victoria St., London S. W. 1, England.

Reports on Progress in Physics, 1 Lowther Gardens, Prince Consort Rd., London S.W.7, England.

Research, Butterworths Scientific Publications, Ltd., 4-6 Bell Yard, Temple Bar, London W.C.2, England.

Review of Scientific Instruments, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.; or Prince and Lemon St., Lancaster, Pa.

Rock Products, MacLean-Hunter Publishing Corp., 309 W. Jackson Blvd., Chicago 6, Ill.

Royal Aeronautical Society, Journal, 4 Hamilton Place, London W.1, England.

Royal Society, Proceedings, Cambridge University Press, Bentley House, London N.W.1, England; or 32 E. 57th St., New York 22, N. Y.

Royal Technical College, Journal, Journal Committee, 72 Howard St., Glasgow C.1, Scotland.

Rubber Developments, British Rubber Development Board, Market Bldg., Mark Lane, London E.C.3, England.

S

SAE Journal, Society of Automotive Engineers, 29 W. 39th St., New York 18, N.Y.

SAE Quarterly Transactions, Society of Automotive Engineers, 29 W. 39th St., New York 18, N. Y.

Science, American Association for the Advancement of Science, 1515 Massachussetts Ave., Washington 5, D. C.

Science News Letter, Science Service, Inc., 1719 N. St., N.W., Washington 6, D. C.

Science Reports of the Research Institutes, Tohoku University (in English), Sendai, Japan.

Scientific American, 24 W. 40th St., New York 18, N. Y.

Screw Machine Engineering, Screw Machine Publishing Co., 65 Broad St., Rochester 14, N. Y.

Sewage and Industrial Wastes, Federation of Sewage and Industrial Wastes, Assn., 325 Illinois Bldg., Champaign, Ill.

Sheet Metal Industries, Industrial Newspapers, Ltd., 49 Wellington St., Strand, London W.C.2, England.

Sheet Metal Worker, Edwin A. Scott Publishing Co., 45 W. 45th St., New York 19, N. Y.

Skillings' Mining Review, David N. Skillings, 810 Fidelity Bldg., Duluth 2, Minn.

Soap and Sanitary Chemicals, MacNair-Dorland Co., 254 W. 31st St., New York 1, N. Y.

Society of Automotive Engineers, Journal (see SAE Journal).

Society of Automotive Engineers, Quarterly Transactions (see SAE Quarterly Transactions).

Society of Chemical Industry, Journal, 56 Victoria St., London S.W.1, England.

Society for Experimental Stress Analysis, Proceedings, Central Square Sta., P.O. Box 168, Cambridge 39, Mass.

Society of Glass Technology, Journal, "Elmfield", Northumberland Rd., Sheffield 10, England.

South African Mining and Engineering Journal, South African Mining Journal Syndicate, Ltd., 201-207 Jubilee House, Simmonds St., Johannesburg, Union of South Africa.

Spectrochimica Acta, Butterworth-Springer, Ltd., 4, 5, 6, Bell Yard, Temple Bar, London W.C.2, England. (U. S. Agent: Jarrell-Ash Co., 165 Newbury St., Boston 16, Mass.

Standardization, American Standards Assn., 70 E. 45th St., New York 17, N. Y.

Steel, Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio.

Steel Equipment & Maintenance News, Box 7997, Pittsburgh 16, Pa.

Steel Horizons, Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

Steel Processing, Steel Publications, Inc., 4 Smithfield St., Pittsburgh 30, Pa.

Steelways, American Iron and Steel Institute, 350 5th Ave., New York 1, N. Y.

Stove Builder, Institute of Cooking and Heating Appliance Manufacturers, Shoreham Hotel, Washington 8, D. C.

Sylvania Technologist, Technical Relations Dept., Sylvania Electric Products, Inc., 40-22 Lawrence St., Flushing, N. Y.

T

Tappi, Technical Association of the Pulp and Paper Industry, 122 E. 42nd St., New York 17, N. Y.
Technical Data Digest (see CADO Technical Data Digest).
Technology Reports of the Tohoku University (mostly English), Sendai, Japan.
Technical News Bulletin (see National Bureau of Standards, Technical News Bulletin).
Tele-Tech, Caldwell-Clements, Inc., 480 Lexington Ave., New York 17, N. Y.
Tele-Vision Engineering, Bryan Davis Publishing Co., 52 Vanderbilt Ave., New York 17, N. Y.
Times Review of Industry, Times Publishing Co., Ltd., Printing House Square, London E.C.4, England.
Tohoku University, Technology Reports, (mostly English), Sendai, Japan.
Tohoku University, Science Reports of the Research Institutes (in English), Sendai, Japan.
Tokyo Institute of Technology Bulletin (in English), Oh-Kayama, Meguroku, Tokyo, Japan.
Tool & Die Journal, Huebner Publications, 1973 Lee Road, Cleveland 18, Ohio.
Tool Engineer, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.
Tooling and Production (see Magazine of Tooling and Production).
Transactions of the American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill.
Transactions of the American Institute of Electrical Engineers, 33 W. 39th St., New York 18, N. Y.
Transactions of the American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.
Transactions of the American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.
Transactions of the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.
Transactions of the British Ceramic Society, North Staffordshire Technical College, Stoke-on-Trent, England.
Transactions of the Canadian Institute of Mining and Metallurgy (see Canadian Mining and Metallurgical Bulletin).
Transactions of the Electrochemical Society, 235 W. 102nd St., New York 25, N. Y. (paging same as Journal; abstracts appear under latter).
Transactions of the Faraday Society, 6 Gray's Inn Square, London W.C.1, England; or Aberdeen University Press, Ltd., 6 Upper Kirkgate, Aberdeen, Scotland.
Transactions of the Institute of Welding, 2 Buckingham Palace Gardens, London S.W.1, England.
Transactions of the Institution of Engineers & Shipbuilders in Scotland, Elmbank Crescent, Glasgow C.2, Scotland.
Transactions of the Institution of Mining and Metallurgy, Salisbury House, Finsbury Circus, London E.C.2, England.
Transactions of the Institution of the Rubber Industry, 12 Whitehall, London S.W. 1, England.
Transactions of the New York Academy of Sciences, Mt. Royal and Guilford Aves., Baltimore 2, Md.
Trend in Engineering at the University of Washington, Engineering Experiment Station, 127 More Hall, University of Washington, Seattle 5, Wash.

U

United States Armed Forces Medical Journal, Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C.
University of Illinois, Bulletin, Urbana, Ill.
University of Washington, Trend in Engineering, Engineering Experiment Station, 127 More Hall, University of Washington, Seattle 5, Wash.

V

Vacuum, W. Edwards & Co., Ltd., Worsley Bridge Rd., Lower Sudenham, London S.E.26, England.
Vancoram Review, Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.
Victor Weld, Victor Equipment Co., 850 Folsom St., San Francisco 7, Calif.

W

Water and Sewage Works, 22 W. Maple St., Chicago 10, Ill.
Welder, Murex Welding Processes, Ltd., Waltham Cross, Herts, England.
Welding (see Welding & Metal Fabrication).
Welding Engineer, 330 W. 42nd St., New York 18, N. Y.
Welding Journal, American Welding Society, 33 W. 39th St., New York 18, N. Y.

Welding & Metal Fabrication (formerly Welding), Louis Cassier, Ltd., Dorset House, Stamford St., London S.E.1, England.

Welding Research (Bound with Institute of Welding, Transactions; see latter for address.) Also available from British Welding Research Association, 29 Park Crescent, London W.1, England.

Western Machinery and Steel World, 564 Market St., San Francisco 4, Calif.

Western Metals, 198 S. Alvarado St., Los Angeles 5, Calif.

Western Miner, Gordon Black Publications, Ltd., 505 Metropolitan Bldg., Vancouver 1, B.C., Canada.

Western Union Technical Review, Western Union Telegraph Co., 60 Hudson St., New York 13, N. Y.

Westinghouse Engineer, Westinghouse Electric Corp., 306 4th Ave., P. O. Box 1017, Pittsburgh 30, Pa.

Wire Industry, 33 Furnival St., London E.C.4, England.

Wire and Wire Products, Quinn-Brown Publishing Corp., 330 Main St., Stamford, Conn.

Wireless Engineer, Iliffe & Sons, Ltd., Dorset House, Stamford St., London S.E.1, England.

Wood, American Lumberman, Inc., 139 N. Clark St., Chicago 2, Ill.

World Oil, Gulf Publishing Co., 3301 Buffalo Dr., Houston 6, Tex.

II. FOREIGN LANGUAGE PERIODICALS

Most of the foreign journals (except Russian) are available through Stechert-Hafner, Inc., 31 E. 10th St., New York 3, N. Y. The Russian journals can be ordered from Four Continent Book Corp., 38 W. 58th St., New York 16, N. Y.

A

Abhandlungen der Braunschwiegischen Wissenschaftlichen Gesellschaft (German), Friendrich Vieweg & Sohn, Verlag G.m.b.H., Braunschweig, Germany.

Académie des Sciences, Comptes Rendus hebdomadaires des Séances (see Comptes Rendus hebdomadaires des Séances de l'académie des Séances).

Academy of Sciences of the USSR, Bulletin, Section of Chemical Sciences (see Izvestiya Akademii Nauk SSSR).

Academy of Sciences of the USSR, Bulletin, Section of Technical Sciences (see Izvestiya Akademii Nauk SSSR).

Academy of Sciences of the USSR, News (see Vestnik Akademii Nauk SSSR).

Academy of Sciences of the USSR, Report (see Doklady Akademii Nauk SSSR).

Acta Chemica Scandinavica (English, French, or German), Frenckellin Kirjapaino Osakeyhtiö, Helsinki, Finland.

Acta Crystallographica (English, French, or German), American Institute of Physics, 57 E. 55th St., New York 22, N. Y., or Cambridge University Press, Bentley House, Euston Road, London N.W.1, England.

Acta Physica Austriaca, Springer-Verlag, Mölkerbastei 5, Vienna I, Austria.

Alluminio (Italian), Istituto Sperimentale dei Metalli Leggeri, 8/10 Via della Posta, Milan, Italy.

Aluminium Suisse (French and German), A. G. Fachschriften-Verlag & Buchdruckerei, 40 Stauffacherquai, Zurich 4, Switzerland.

Angewandte Chemie (German), Verlag Chemie, G.m.b.H., Berstr., Weinheim 17a, Germany.

Annalen der Physik (German), Johann Ambrosius Barth Verlag, 18B Salomonstr., Leipzig Cl, Germany.

Annales de Chimie (French), Masson et Cie., Libraires de l'Academie de Medicine, 120 Blvd. St-Germain, Paris 6, France.

Archiv für das Eisenhuttenwesen(German), Verlag Stahleisen M.b.h., 1 August Thyssen Str., Dusseldorf, Germany.

Arkiv für Fysik (mostly English), Almqvist & Wicksells Boktryckeri A.B., Stockholm, Sweden

Archiv für technisches Messen (German), R. Oldenbourg Verlag, 2b Lotzbeckstr., Munich, Germany.

Associação Brasiliera de Metais, Boletim (Portuguese), 110 Praca Cel. Fernando Prestes, Sao Paulo, Brazil.

ATM (see Archiv für technisches Messen).
Avtogennoe Delo (Russian), 2a Spartakovskaya, 3 Glavkislorod, Moscow, U.S.S.R.

B

Berg- und Hüttenmännische Monatschefte der Montanistischen Hochschule in Loeben (German), Springer-Verlag, 5 Mölkerbastei, Vienna 1, Austria.
Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V. (German), 15 Poppelsdorfer Allee, Bonn-am-Rhein, Germany.
Boletim da Associaçáo Brasiliera de Metais (see Associaçáo Brasiliera de Metais, Boletim.
Braunschweigischen Wissenschaftlichen Gesellschaft, Abhandlungen, (see Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft.
Brennstoff-Chemie(German), W. Girardet, Essen, Germany.
Brennstoffe - Wärme - Kraft (German), Deutscher Ingenieur Verlag, G.m.b.H., 77 Prinz-Georg Str., Dusseldorf, Germany.
Bulletin of the Academy of Sciences of the USSR, Section of Chemical Sciences (see Izvestiya Akademii Nauk SSSR).
Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences (see Izvestiya Akademii Nauk SSSR).
Bulletin du Cercle d'Études des Métaux (French), 9 Place de l'Hotel-De-Ville, St. Etienne (Loire), France.
Bulletin de la Société Chimique de France (see Société Chimique de France, Bulletin).

C

Casting Institute of Japan, Journal, (see Journal of the Casting Institute of Japan).
Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques (see Circulaire d'Informations Techniques).
Cercle d'Études des Métaux, Bulletin, (see Bulletin du Cercle d'Études des Metaux).
Chaleur & Industries (French), 2 Rue des Tanneries, Paris 13, France.
Chemie - Ingenieur - Technik (German) Verlag Chemie, G.m.b.H., 3 Pappelallee, Weinheim-Bergstrasse, Germany.
Chemische Technik (German), Verlag Technik G.m.b.H., 12 Unter den Linden, Berlin, N.W.7, Germany.
Chimia (French, German, or Italian), Rascher-Verlag, Zurich, Switzerland.
Circulaire d'Informations Techniques (French), Centre de Documentation Sidérurgique, 6 Rue de Lota, Paris 16, France.
Coal (see Ugol).
Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences (French), Gauthier-Villars, 55 Quai des Grands-Augustins, Paris, France.

D

Das Gas- und Wasserfach (see Gas- und Wasserfach).
Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleutes e. V., Berichte, (see Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleutes e. V.).
Die Neue Giesserei (see Giesserei).
Doklady Akademii Nauk SSSR (Russian), Mezhdunarodnaya Kniga, 18 Kuznetskii Most, Moscow, USSR.

E

Erdöl und Kohle (German), Industrieverlag von Hernhaussen Kommanditgesellschaft, 39 Lietzenburger Str., Berlin W15, Germany.
Engenharia, Mineraçao e Metalurgia (formerly Mineraçao e Metalurgia) (Portugese), 135 rua Seta de Setambro, Rio de Janeiro, Brazil.
Experientia (English, French, German, or Italian), Verlag Birkhauser, A.G., Basel 10, Switzerland.

F

Fonderie (French), Éditions Techniques des Industries de la Fonderie, 12 Avenue Raphael, Paris 16, France.
Fortschritte der Chemischen Forschung (German), 1 Jebenstr., Berlin-Charlottenburg 2, Germany.
Fresenius' Zeitschrift für analytische Chemie (German), Springer-Verlag, 24 Neuenheimer Landstr., Heidelberg, Germany.

G

Gas- und Wasserfach (German), R. Oldenbourg, Munich 1, Germany.

Giesserei (formerly Neue Giesserei) (German), Giesserei Verlag G.m.b.H., 1 August Thyssen Str., Düsseldorf, Germany.
Gjuteriet (Swedish), 5 Floragatan, n. b., Stockholm, Sweden.
Government Chemical Industrial Research Institute, Japan, Reports (Japanese), 1-Chome, Hatagaya Hon-machi, Shibuya-ku, Tokyo, Japan.

H

Helvetica Chimica Acta (French, German, or Italian), Schweizerische Chemische Gesellschaft, Basel 7, Switzerland.
Helvetica Physica Acta (French, German, or Italian), Verlag Birkhauser A.G., Basel, Switzerland.
Hutnické Listy (Czech), Mucednicka 8, Brno-Zabovresky, Czechoslovakia.
Hutnik (Polish), Robotnicza Spoldzielna Wydawnicza "Prasa", 11 Sobieskiego ul., Katowice, Poland.

I

Industrial Power (see Promyshlennaya Energetika).
Instituto del Hierro y del Acero (Spanish), 15 Villanueva, Madrid, Spain.
Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh, (Russian), Mezhdunarodnaya Kniga, 18 Kuznetskii Most, Moscow, USSR.
Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh,(Russian), Mezhdunarodnaya Kniga, 18 Kuznetskii Most, Moscow, USSR.

J

Jernkontorets Annaler (Swedish), 6 Kungsträdgardsgatan, Stockholm C, Sweden.
Journal of Applied Chemistry (see Zhurnal Prikladnoi Khimii).
Journal of the Casting Institute of Japan (Japanese), Totsuka-machi, 1-chome, 500 Sinjiku-ku, Tokyo, Japan.
Journal de Chimie Physique et de Physico-Chimie Biologique (French), Société de Chimie Physique, Ecole Nationale Superieure de Chimie, 11 Curie, Paris 5, France.
Journal du Four Électriques et des Industries Électrochimiques (French), 86 Rue Gardinet, Paris 7, France.
Journal of General Chemistry (see Zhurnal Obshchei Khimii).
Journal of Mechanical Laboratory (Japanese), Government Mechanical Laboratory, Agency of Industrial Science and Technology, Sumiyoshicho Suginami-ka, Tokyo, Japan.
Journal de la Soudure (Zeitschrift für Schweisstechnik) (French and German), 36 Stauffacherquai, Zurich 1, Switzerland.

L

La Metallurgia Italiana (See Metallurgia Italiana).
La Métallurgie et la Construction Mecanique (See Métallurgie et la Construction Mecanique).
Lastijdschrift (See Revue de la Soudure).
Legkaya Promyshlennost, (Russian), Ministry of Light Industry of the USSR and RSFSR, Moscow, USSR.
LeVide (French) (See Vide).
Light Industry (See Legkaya Promyshlennost).
L'Ossature Métallique, Le Centre Belgo-Luxembourgeois d'Information de l'Acier, 154 Avenue Louise, Brussels, Belgium.

M

Machine Tools and Equipment (See Stanki i Instrument).
Metalen (Dutch or English), Drukkerij-Uitgeverij "de Hofstad," 1-3 Scheepmakersstraat, The Hague, Netherlands.
Metall (German), Metall-Verlag G.m.b.H., 38 Düsseldorfter Str., Berlin W15, Ger.
Metalloberfläche (German), Carl Hanser Zeitschriften Verlag G.m.b.H., 7 Leonhard-Eck Str., Munich 27, Germany.
Metallurgia Italiana (Italian), Associazone Italiana di Metallurgia, 10 Via S. Paolo, Milan, Italy.
Métallurgie et la Construction Mécanique, 79 Champs Elysees, Paris 8, France.
Métaux: Corrosion — Industries (French), Editions-Métaux, 32 rue de Maréchal-Joffre, St.-Germain-en-Laye (Seine-et-Oise), France.
Métaux & Corrosion (French), Editions-Métaux, 32 rue du Maréchal-Joffre, St.-Germain-en-Laye (Seine-et-Oise), France.
Mikrochemie vereinigt mit Mikrochimica Acta (French, English, or German), Springer-Verlag, 5 Molkerbastei, Vienna 1, Austria.
Mineraçao e Metalurgia (Portuguese), 3 pigo, 135 Rua Sete de Setambro, Rio de Janeiro, Brazil.

Monatsheft für Chemie und verwandte Teile anderer Wissenschaften (German), Springer-Verlag, 5 Molkerbastei, Vienna 1, Austria.

N

Naturwissenschaften (German), Springer-Verlag, 20 Reichpietschufer, Berlin W35, Germany.
Neue Giesserei (see Giesserei).
News of the Academy of Sciences of the USSR, (see Vestnik Akademii Nauk SSSR).

O

Ossature Métallique (see L'Ossature Metallique).

P

Peat Industry (see Torfyanaya Promyschlennost).
Physica (English, French, or German), Dr. W. J. Beekman, Treasurer of the Physicist Foundation, 6 Bijhouwerstraat, Utrecht, Netherlands.
Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa (see Prace Glownego Instytutu Metalurgii).
Prace Glownego Instytutu Metalurgii (Polish), 12-14 Ul. K. Kiarki, Gliwice, Poland.
Progress in Chemistry (see Uspekhi Khimii).
Progress in Physical Sciences (see Uspekhi Fizicheskikj Nauk).
Pro-Metal (French and German), Metallverband A.G., Berne, Switzerland.
Promyshlennaya Energetika (Russian), Mezhdunarodnaya Kniga, 18 Kuznetskii Most, Moscow, USSR.

R

Reports of the Academy of Sciences of the USSR (see Doklady Akademii Nauk SSSR).
Reports of the Government Chemical Industrial Research Institute, Tokyo, (Japanese), 1-chome, Hatagaya Honmachi, Shibuya-ku, Tokyo, Japan.
Revue de l'Aluminium (French), 77 Blvd. Malesherbes, Paris 8, France.
Revue Générale des Sciences pures et appliquées et Bulletin de la Société Philomathique (French), Société d'Edition d'Enseignement Superieur, 5 Place de la Sorbonne, Paris 5, France.
Revue de Métallurgie (French), 5 Cite Pigalle, Paris 9, France.
Revue de la Soudure (French), 21 Rue des Drapiers, Brussels, Belgium.
Revue Universelle des Mines, de la Métallurgie, des travaux Publics, des Sciences et des Arts appliques a l'Industrie (French), 12 Quai Paul van Hofgaerden, Liege, Belgium.

S

Schweissen und Schneiden (German), Friendrich Vieweg & Sohn, 1 Burgplatz, Braunschweig 20b, Germany.
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SUBJECT INDEX

Since the annotations in the main section of this book are classified into 19 main sections based primarily upon processes and properties, the emphasis in this index has been placed on materials, products, and applications.

Entries under names of processes and properties usually refer only to general treatments of the subject. Wherever possible, items have been indexed under the name of the material or type of material (usually metals, alloys, or metal forms), or under product name. For the latter, broad designations like "Agricultural equipment" are preferred for main headings. Specific items such as "plows" usually are mentioned only in the subheadings. For example, material on rolling of aluminum alloys appears under "Aluminum alloys, rolling of"; rather than under "Rolling, of aluminum alloys".

An attempt has been made to make the heads as specific as the source material, but not more so. On the other hand, the various specific aspects of a book or treatise on a broad subject are not indexed separately. In general, subject headings have been chosen to conform with the usage in the "ASM-SLA Metallurgical Literature Classification", published by the American Society for Metals, 1950.

Alloy systems in which one member is predominant in percentage composition are indexed under that member only. For example, magnesium-base alloys containing aluminum and zinc are indexed only under "Magnesium alloys, aluminum-zinc". On the other hand, when one element is not predominant, such as an abstract dealing with a ternary alloy, it is indexed under each of the three elements involved. Alloy steels and alloy cast irons are indexed under the designations "Steels, alloy" and "Cast irons, alloy", respectively, followed by the names of the alloying elements, if necessary. — W. W. Howell

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